the OIL AND GAS JOURNAL

Air compressors blow drill cuttings to surface at half the cost... *with help of TIMKEN® bearings*

How GARDNER-DENVER mounts the crankshaft of its 500 cubic-foot size air compressor on Timken tapered roller bearings. Dependable operation and long life are assured.

Gardner-Denver air compressors (left) supplying air to blow drill cuttings to surface (right).

CAVERNS encountered in surface drilling operations in California made removal of cuttings quite a problem for a nationally known oil company. Rotary mud proved impractical because circulation was lost in the cracked and porous rock. And the cable tool method was too slow, could not maintain straight holes. Timken® bearing equipped air compressors manufactured by Gardner-Denver were called in on the job. Result: drill cuttings are now *blown* to the surface at half the cost.

With Timken tapered roller bearings on the crankshafts, the compressors are assured of a steady and always ready supply of air for the tough job. Maintenance is held to a minimum, there's less chance of breakdowns.

Timken bearings take all radial, thrust and combination loads. They provide extra load-carrying capacity because of line contact between their rollers and races. Crankshafts are held in proper alignment. There's no crankshaft wear, and there's less wear on other moving parts. Wear within the bearings is practically eliminated by their true rolling motion and incredibly smooth surfaces.

Be sure to specify Timken bearings for your machinery. Look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN

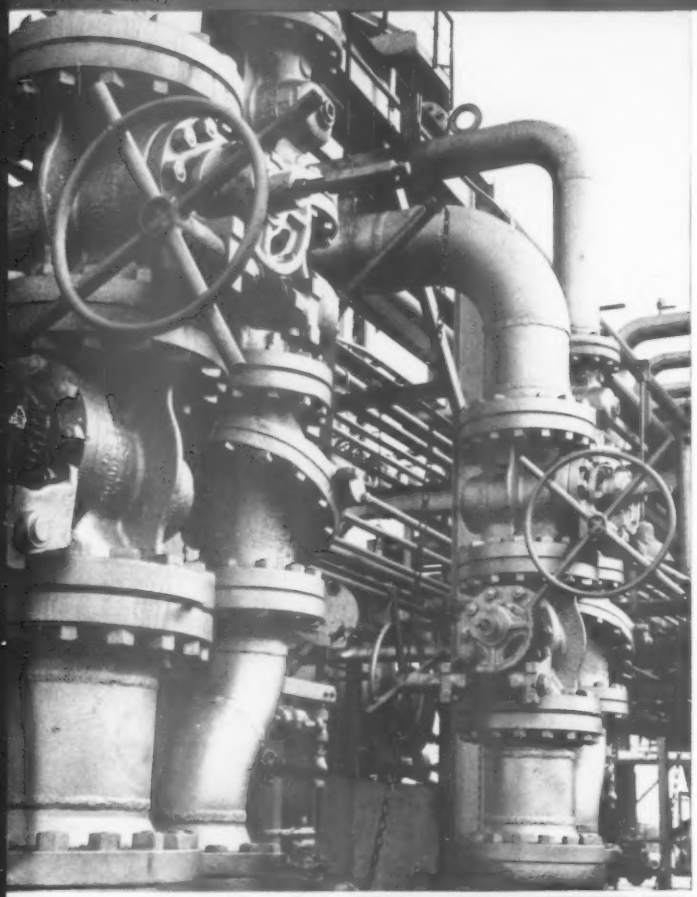
TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ↓ AND THRUST →◫← LOADS OR ANY COMBINATION →✳←

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 **MAY 4, 1953**

Lubricaut MAKES THE DIFFERENCE



NORDSTROM VALVES

CUT MAINTENANCE ON COMPLEX REFINERY SERVICES

No question about it—proper maintenance of Nordstrom lubricated valves costs very little compared to the major repair and replacement costs of ordinary valves in complex refinery service.

Look into a Nordstrom valve and you'll see why—

1. **Lubricant protects plug and body against abrasion and galling. That means longer valve life.**
2. **Lubricant permits sliding rather than wedging.**
3. **Lubricant makes the valve self-cleaning. If dirt is lodged between plug and body, lubricant and the rotary action of the plug free it in a turn or two.**
4. **Lubricant keeps the valve ready to turn in an emergency.**

Nordstrom makes the proper lubricant for each refinery service, too, perfectly complementing the wide range of sizes, types and pressure classes in the Nordstrom line.

You'll save money, you'll avoid shut-downs, you'll have easier valve operation throughout the refinery if you standardize on Nordstrom valves and genuine Nordstrom lubricants. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

ROCKWELL Built

Nordstrom Valves

Lubricant-Sealed for Positive Shut-Off

Another Rockwell Product

the OIL AND GAS JOURNAL

MAY 4, 1953 VOL. 51 NO. 52

OIL IN THE NEWS . . .

Future Water-Flood Requirements Estimated at Oil-Recovery Meeting 66
Railroad Commission Announces Appeal of Court Spraberry Ruling 67
Kelly-Snyder Field Rules Opposed at Railroad Commission Hearing 68
I.P.A.A. Endorses 10 Per Cent of Demand Limit on Petroleum Imports 69
Gas-Production Regulation, Price Fixing Urged at I.P.A.A. Meeting 70
Imports Threaten Conservation, Compact Meeting Speakers Agree 70
Fracturing Holds Great Promise for Future, Compact Told 71
Colorful Ceremonies Planned to Open Petroleum Exposition May 14 73
Octane Ratings Show Only Slight Gain During First Quarter 74
Rising Gas Costs Cutting Gasoline-Plant Profits, N.G.A.A. Told 75
Huge Increase in L.P.G. Underground Storage Forecast 75
House Passes Appropriations Bill, Cuts Interior Budget 78
Tidelands Bill Expected to Pass Senate This Week 78
Grand Jury Investigation of Alleged Oil Cartel Is Dropped 79
Rocky Mountain Geology Discussed at Casper Meeting of A.A.P.G. 80
Iran Offers Crude and Products to Dollar Buyers at Half Price 85
American Independent Under Way on Neutral Zone Confirmation Well 85
Optimism: A Key to the Williston Basin 179
There's No Easy Road to Oil Finding 182

NEWS FEATURES . . .

They Say 55
Calendar of Events 57
Journally Speaking 61
Editorial 63
This Week 65
Watching Washington 79
International News 85
Personals 89
Deaths in the Industry 91
Pipe-Line News 166
Drilling Contractors 171
Natural-Gas News 175
Natural-Gasoline News 175
Refining News 176
Areal Field Report 184
Exploration Statistics 199
Production Statistics 200
Refining Statistics 201
Market Statistics 202

TECHNOLOGY AND OPERATION . . .

[1]Petroleum Report: New Houston Acrylate Plant 92
By F. Lawrence Resen
[2]What Oil Companies Want in Drilling Safety 94
By A. E. Chester
[3]Prolific Water Flood in East Kansas 96
By J. D. Walters
[4]Mitigating Corrosion in Refining Equipment 101
By Gerald L. Farrar
How Sohio Trains Exploration Personnel 109
By M. W. Sherwin
How to Prevent Gas-Stream Contamination 113
By R. B. Tuttle
[5]Imperial's Sarnia-Toronto Products Pipe Line 116
New Schlumberger Plant Ready for Operations 120
On the Job in Fields and Plants 132
Engineering Reference Section 139-147
Equipment Digest 161

DEPARTMENTS . . .

Books 108-114
On the Job—Plants 132
On the Job—Fields 137
Engineering Reference 139
Instruments 141
Heat Transfer 143
Questions on Technology 145
Modern Drilling 147
Equipment Men in News 149
Pipe-Line Construction 153
Digest of New Equipment 161
Active Rotary Rigs 172
Refinery Construction Index 176
Classified Advertising 203
Advertisers' Index 207

In Brief . . .

1. NEW PROCESS . . . Rohm & Haas Co. has completed new Houston petrochemical plant for manufacture of methyl and ethyl acrylate by a new process which will permit a decrease of 6 to 7 cents a pound in the prevailing prices of these materials. A continuous catalytic process reacting acetylene, carbon monoxide, and an alcohol is employed. An alternative method, using ethylene oxide and hydrogen cyanide, has previously been used. Yields of 80 to 90 per cent, based on acetylene and carbon monoxide, are realized in the new process.

•

2. SAFER DRILLING . . . The oil company is extremely interested in the adoption of safe drilling practices by the drilling contractor. The primary reason for this concern is humanitarian interest. The second most important reason is to protect property which might be damaged, including both surface and underground facilities. The third reason has to do with protecting the operator's good name. Fourth and last reason for drilling safely is to protect the good name of the petroleum industry generally.

•

3. UNUSUAL PIPE-LINE FEATURES . . . Imperial's Sarnia-Toronto Products Pipe Line was laid in the same ditch with a second line for another company. Construction features, such as bending, welding, and keeping the lines separated, were complicated thereby. Harbor crossing was planned to allow the pipe to be free to settle for many years. Line was laid across Hamilton Harbor in two big loops, thereby providing necessary slack.

•

4. MITIGATING REFINERY CORROSION . . . Small changes in plant operating conditions will often result in excessively high corrosion rates. The plant inspection personnel must be especially aware of these changes and make every effort to determine their effects on corrosion rates. In one case, a change in feed rate to a combination crude-distillation unit caused corrosion in the atmospheric heater tubes to increase manyfold.

•

5. PROLIFIC WATER FLOOD . . . Waterflood operations covering a 4-year period at Sunray Oil Corp.'s Fankhauser unit have recovered to date an amount of oil almost equal to that obtained by primary methods over a preceding 23-year period. Rate is presently nine times what it would have been under continuation of primary conditions. Two wells have each produced more than 100,000 bbl. of oil.

•

REFINERY INDEX . . . Nelson's refinery-construction index appears on page 176 of this issue.

See it at the show!

It's brand new
It's lighter
It's shorter

... a new Fairbanks-Morse Diesel for drilling service!

This compact power package is a new Fairbanks-Morse Opposed Piston Diesel—designed for *continuous* heavy-duty drilling service. All steel construction makes it 20% lighter and 20% shorter than engines of comparable speed and horsepower ratings and assures greater rigidity and shock resistance.

You get a drilling service range from 330 to 825 horsepower from this 2-cycle Fairbanks-Morse Model 38F5¼ Diesel. Its unique opposed-piston design means fewer parts to wear, maintain and replace. Be sure to see it at the show!

Fairbanks, Morse & Co., Chicago 5, Illinois.

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OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL & GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

Macwhyte 6x25F PREformed Monarch Whyte Strand Wire Rope with I. W. R. C.

How many moving parts?

- In this particular rope construction there are 199 individual wires. Each is a carefully designed "moving part."
- Outside wires are one size. Inside wires are another size. Core and filler wires are still other sizes.
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- To assure highest quality, all stages of wire manufacture and rope fabrication are closely controlled.
- An exact "breathing space" between each wire is provided in order to increase flexibility.
- Each wire is protected with a film of lubricant that is force-fed *cold* during the fabricating.
- Since any piece of wire rope is a complicated piece of machinery, precision is as important in its manufacture as in the making of a fine watch.
- In designing and manufacturing its thousand and one wire ropes, Macwhyte exercises all the special care that assures long service and low cost to you. May our engineers recommend the right rope for *your* equipment?

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MACWHYTE WIRE ROPE

THE RIGHT ROPE FOR YOUR EQUIPMENT

Ask for G-15 Handbook

MACWHYTE COMPANY
KENOSHA, WIS.

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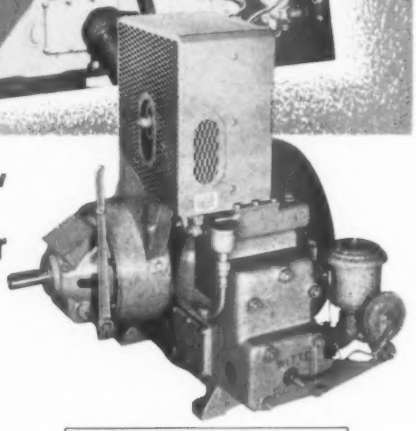
. . . the Oil Field WITTE Model "98" . . . designed especially for your smaller pumping installations.



● The Witte Model "98" is a gas-gasoline, horizontal, single cylinder, condenser cooled engine with single flywheel and lever-operated clutch power take-off. It has a medium speed range of 500 rpm to 1200 rpm and in continuous 24-hour-day operation, is rated from 4 to 9.2 horsepower.

The Model "98" is compact in design, simple to operate and has such characteristic Witte, *built-in*, engineering features as: aluminum piston, removable-wet-cylinder liner, tapered-roller-main bearings, crankshaft dynamically balanced with integral counterweights and simple, splash lubrication.

Write today for complete information about the Oil Field Witte Model "98" Engine.

WITTE ENGINE WORKS

OIL WELL SUPPLY DIVISION, UNITED STATES STEEL CORPORATION
Kansas City 26, Mo.

WITTE ENGINES

Gas-gasoline models from 4 to 15.5 hp

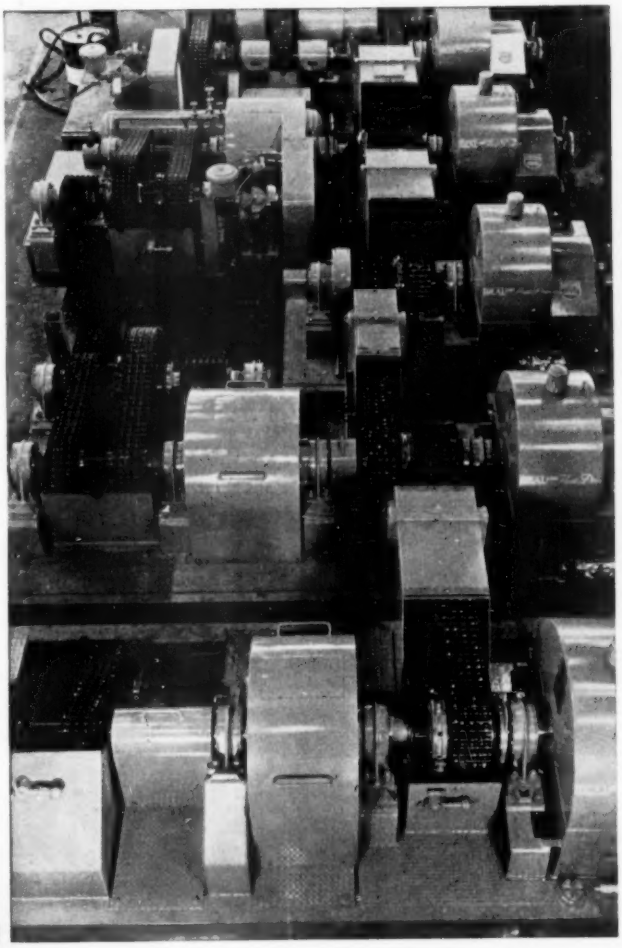
Full diesel models from 3.75 to 12.5

UNITED STATES STEEL

The largest power plant of any Gulf Coast drilling rig transmits

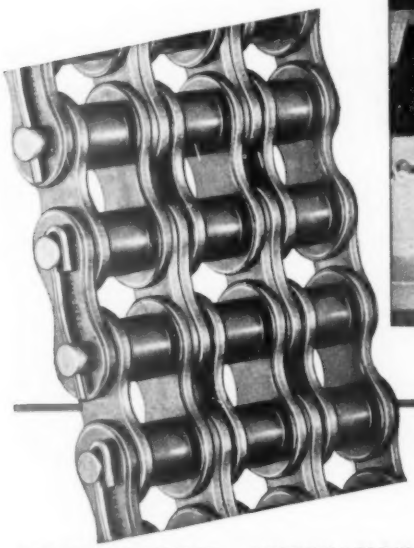
3350 HP thru LINK-BELT ROLLER CHAIN DRIVES

This is a view of the compound on the National 160 Rig installed on Richardson & Bass' new drilling barge, the "Blind Pass". This big rig is completely equipped with multiple width Link-Belt Precision Steel Roller Chain, and is the same type rig as that which drilled the world's deepest hole—20,521 feet—in 1949. It provides a total of 3350 horsepower—the largest power plant on any drilling rig in the Gulf Coast area.



Link-Belt Precision Steel Roller Chain is the oilfield choice for heavy duty service especially where shock loading is a factor. Link-Belt Rollers are shot peened, a process which gives them extra fatigue life, added ability to withstand shock and impact. And Link-Belt precision-controlled heat treating guarantees absolute uniformity of all chain parts.

Specify Link-Belt for the tough power transmission problems. Dependable power transmission by means of Link-Belt Precision Steel Roller Chain is your best assurance of economical rig operation. For the complete Link-Belt story, call the nearest Link-Belt service engineer.



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ROLLER CHAINS and SPROCKETS

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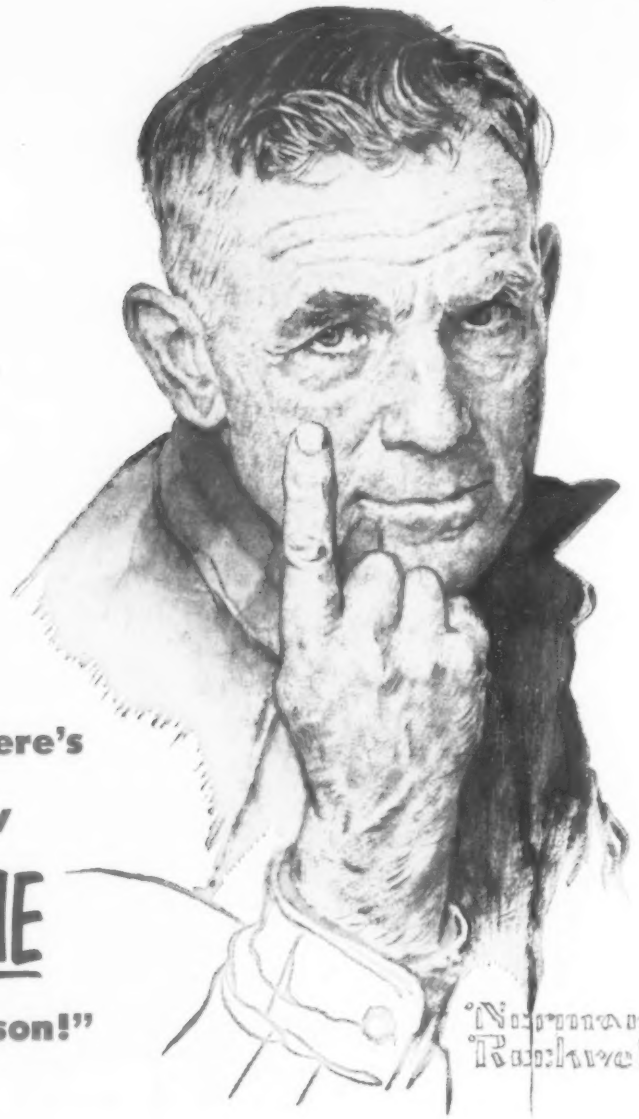

IT'S JUST THAT SIMPLE. There's only one reason in the world why 2 out of 3 wire rope users in the oil fields prefer Roebling wire rope... *it costs less on the job than any other.*

For maximum wire rope efficiency and economy, call your nearest Roebling office for a Field Man. He'll recommend the best ropes for your operations... District Offices at Cleveland, Denver, Houston, Los Angeles, Odessa, Tulsa.

ROEBLING CF&I

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Introducing a new, greatly improved portable mast...

with these *outstanding* features:

1. *Ground-level assembly**
2. *Speed-pin connections*
3. *Four-legged construction*
4. *Positive line control during erection*
5. *Seamless forged steel sheave rims*
6. *Greater portability*

Emsco's new A Series mast meets the need for a sturdier, more rugged type of portable mast...one that is faster and easier to assemble.

The 4-legged design of the new mast provides safe, positive line control during erection. It pivots on its rear legs and is raised or lowered in a smooth, uninterrupted operation, utilizing *only* the power of the hoist. The gin pole carries none of the working load.

Design of the substructure permits the complete drilling unit to be moved in one-piece on auxiliary wheels or tracks. In order to reduce rig-up time, speed-pin connections are used on all sections of the mast and substructure. The mast is rigid enough to be moved as a unit, or it can be nested in sections.

Minimum interior bracing and open-face design make possible fast, safe round-trip operations. The mast is available in three models and heights: A-94 and A-126—capacity, 340,000 lbs., and A-133—capacity, 620,000 lbs.

EMSCO

REG. U.S. PAT. OFF.

EMSCO MANUFACTURING COMPANY

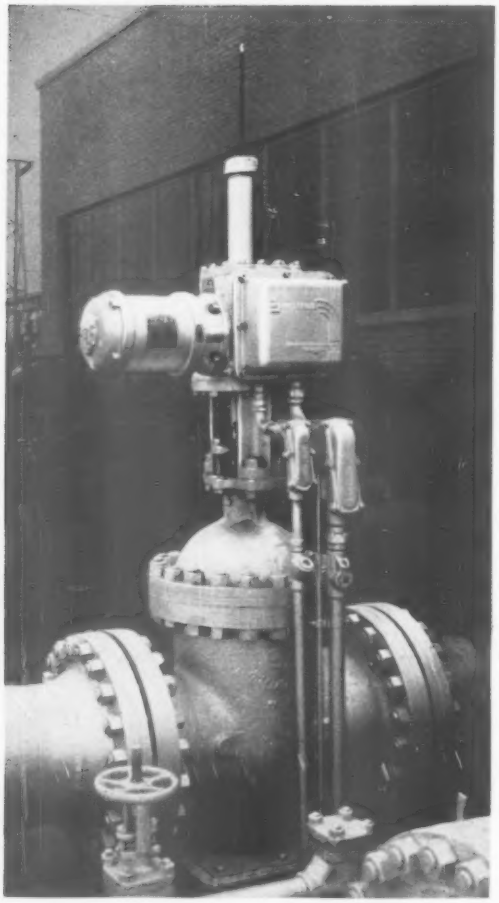
Garland, Texas · LOS ANGELES, CALIF. · Houston, Texas

* *Faster, Safer Assembly*... Design of the A Series mast permits the use of higher substructures, as it is not necessary to assemble the mast at derrick floor level. On 8′ substructures the mast is assembled at ground level; 10′ substructures at 2′ off ground, etc.

E-144

LIMITORQUE

The most widely used operator for REMOTE CONTROL of valves



In refineries and on pipelines all over the world, LimiTorque Valve Controls are giving dependable performance. They open and close valves of all types, quickly, safely, surely. With push buttons and indicating light panels, valves can be operated at remote locations while the status of the valves is always clearly known. Electricity, air or gas may be used for actuation. On many recent installations the high pressure gas in the lines has been utilized as a power source.

Your valve manufacturer can supply LimiTorque Controls.

Write for a copy of catalog L-5 or tell us your valve operating problem. Our engineers will gladly help you find a solution.

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TULSA MAY 14-23
Texas Bldg. 36 & 37

Features:

- DUAL SEALING *Multiplied by* Line Pressure
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- SELF-ALIGNING
- NON-JAMMING
- SELF-CLEANING
- NON-DISTORTING
- SQUEEGEE WIPING
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- REVERSIBLE FLOW
- NON-SCORING
- MINIMUM MAINTENANCE
- NON-GALLING
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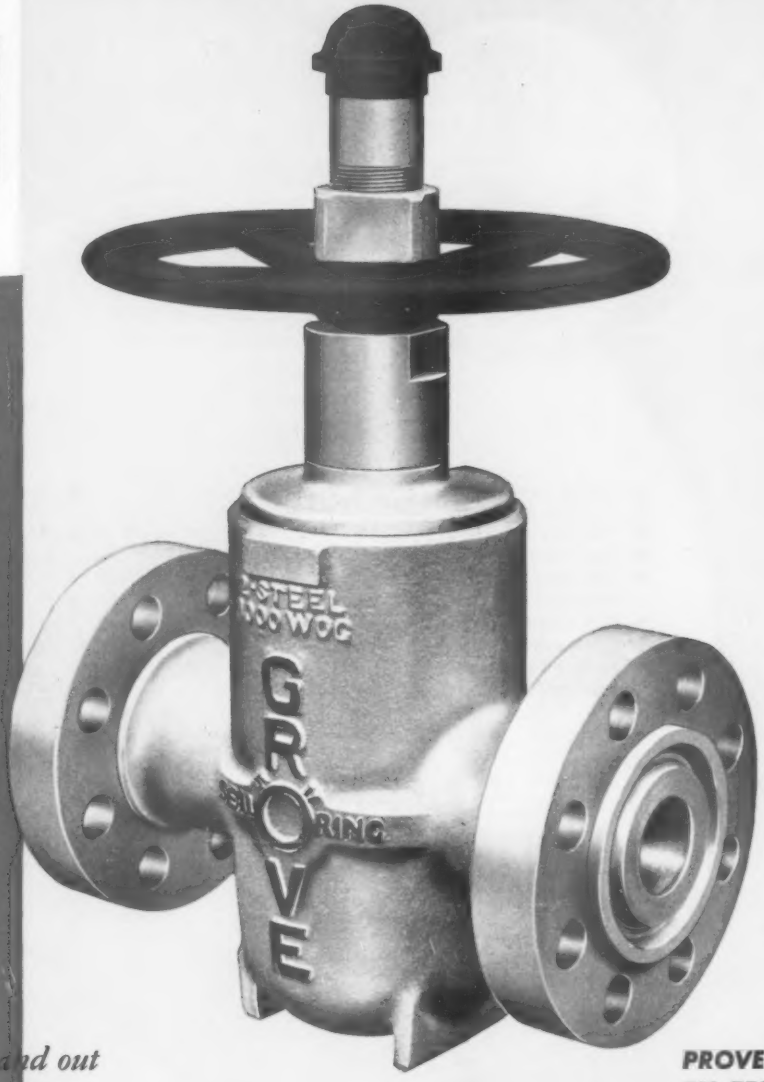


Streamlined in and out

PROVED BY TEST

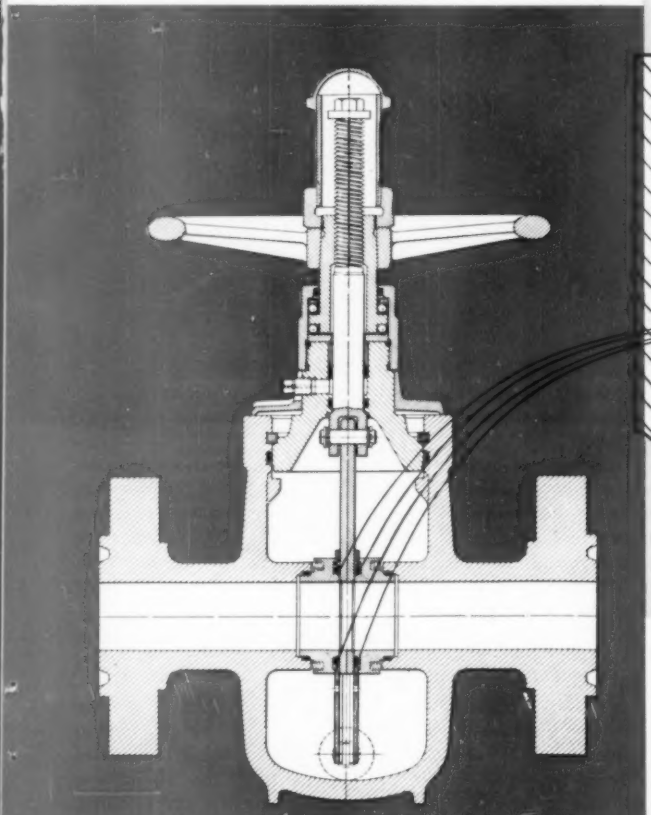
GROVE
WIPES CLEAN
PROTECTS
SEALS

The dynamic GROVE

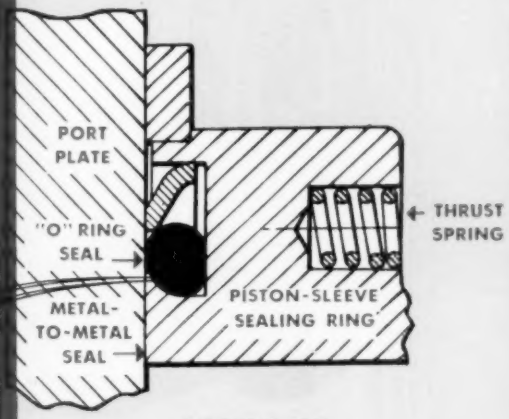
The latest master-engineered product of

· WITH IMPASSABLE SEAL Bubble-Tight

A completely new valve concept—An amazing advancement in valve design, the result of five years of intensive development by Grove Engineers, is proudly presented. It's the Grove Seal "O" Ring Gate Valve, combining extraordinary features that insure its acceptance as the leader in the petroleum field. The Seal "O" Ring applies the simple physics of a precision finish port-plate sliding between dual metal sealing rings, the seal augmented by dual "O" rings. It is the simplest of all high-pressure designs. With *full-opening* and an *impassable seal*, this valve offers the most effective means of valve closure ever conceived, for withstanding up to 10,000-lb. pressures.



The sealing assembly and port-plate are full-floating, insuring perfect alignment, regardless of line pressure. Flow can be reversed. Ball-bearing mounted stem. Effective "O" ring chamber seals.



A DOUBLE SEAL

The metal sealing ring and resilient "O" ring are constantly imposed against the sliding port-plate. If any line pressure should pass the metal-to-metal seal, it is positively blocked by "O" ring. The greater the pressure, the more effective the seal.

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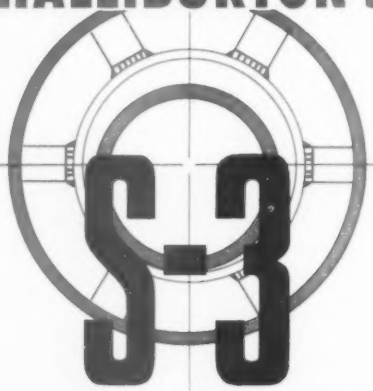
PROTECTS CASING
ALL THE WAY DOWN

HALLIBURTON'S



CENTRALIZER

In addition to its primary role of centering casing for more uniform cementing, Halliburton's S-3 Centralizer actually protects valuable casing *all the way down hole.*

There are many reasons why the S-3 is able to provide this extra protection and also aid in securing a stronger, longer-lasting cement job.

It centers casing more precisely because springs of the S-3 have far less permanent set. Rugged tests by Halliburton's big Baldwin-Southwark testing machine reveal that these heat-treated springs suffer less bowed-height loss. This ability to resist deflection aids positive centering force where needed after trip to bottom.

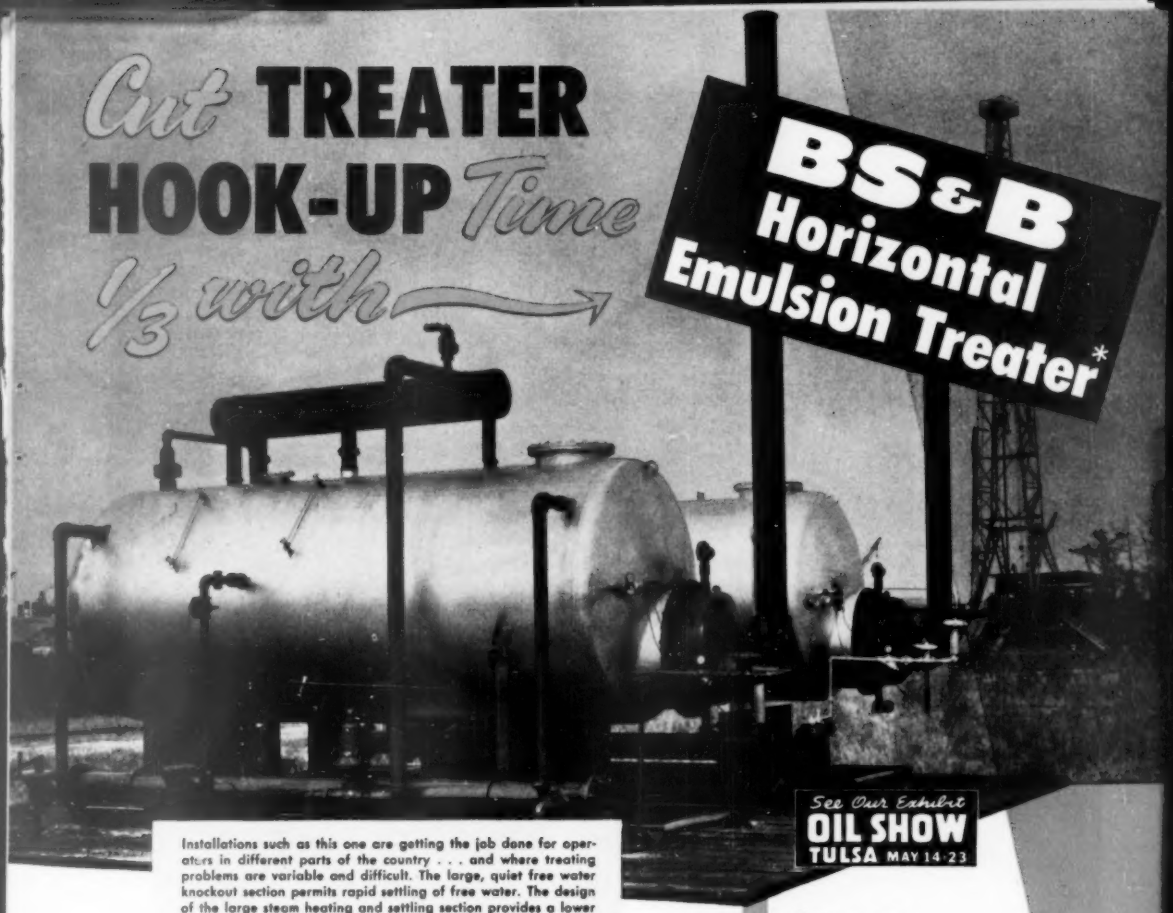
Springs never touch casing. Centering load is transmitted directly to sturdy end bands, allowing sufficient clearance for free rotation of casing under normal hole conditions . . . with less torque.

Halliburton's S-3 Centralizers have other advantages that make them a valuable low-cost investment: ease of installation while running casing; minimum obstruction to annulus flow between wall and casing; lap-welded springs and hinge-type construction; plus unique design that fits them to any standard hole for any O. D. size, simplifying ordering and stocking, and eliminating on-the-job adjustments.

Phone your nearby Halliburton representative, or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

YEARS AHEAD IN PRODUCTION IMPROVEMENT TECHNIQUES!

Cut TREATER HOOK-UP *Time* *1/3 with* BS&B Horizontal Emulsion Treater*



Installations such as this one are getting the job done for operators in different parts of the country . . . and where treating problems are variable and difficult. The large, quiet free water knockout section permits rapid settling of free water. The design of the large steam heating and settling section provides a lower water level—thus a larger oil heating and settling space. The closed system steam chest means the heating unit is free from sedimentation and caking trouble since the hot surface of the firetube is never in contact with the oil or salt water . . . burnouts and loss of firebox efficiency are eliminated.

See Our Exhibit
OIL SHOW
TULSA MAY 14-23

Customers report that BS&B's Horizontal Emulsion Treater cuts average hook-up time to 1/3, as compared to other types and makes of treaters. This is possible since the only connections necessary are the oil inlet and outlet and the gas outlet. Connections are provided for fuel gas supply and to equalize the diaphragms of the OWC valves to the treater gas space. Treater is easy and quick to set, requiring minimum foundation, especially when purchased with skids.

BS&B made the steam chest practical and efficient. If you require average treating temperatures (110 to 160°F) and if corrosion is a problem or you've had serious burnouts better see your BS&B representative. He wants to talk . . . you'll be money ahead to listen.

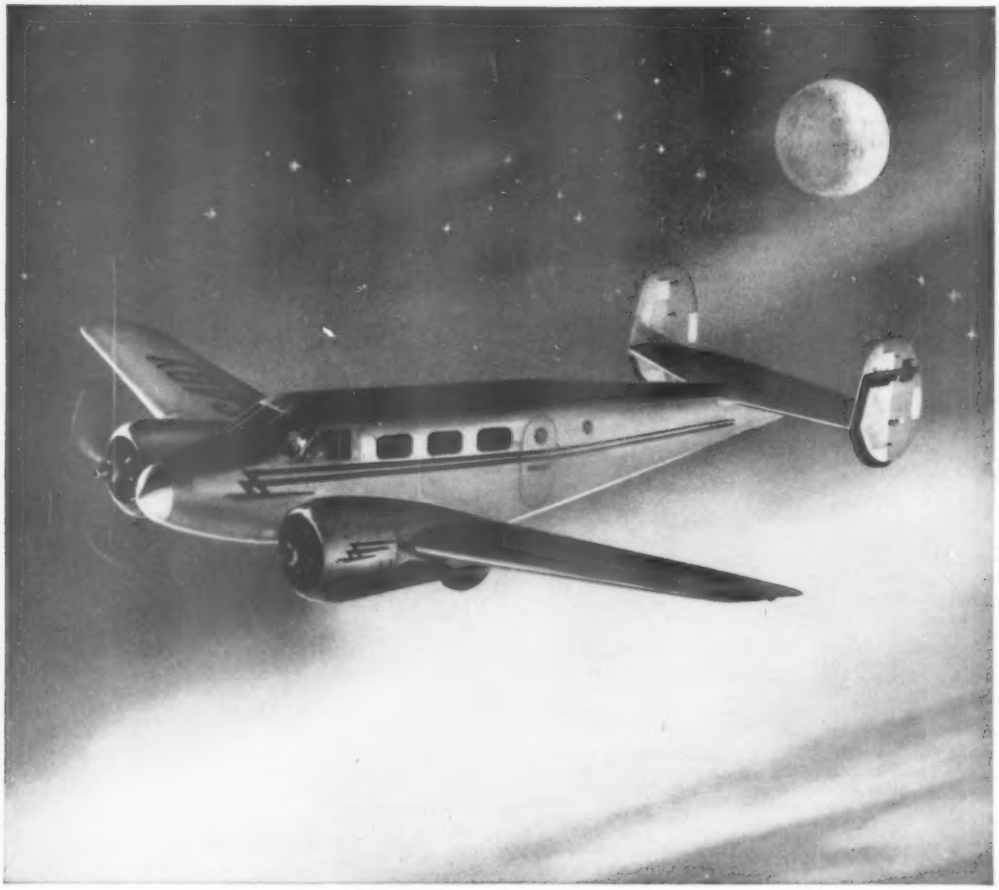
*Patent Pending

Customers Praise These Other BS&B Advantages

1. **Low fuel gas consumption**
2. **Lower treating temperatures**
3. **Ease of installation**
4. **Large settling space**

BLACK, SIVALLS & BRYSON, INC.
Oil & Gas Equipment Division, Dept. 1-A5
2131 Westwood Blvd. Oklahoma City, Oklahoma

EFFICIENCY BS&B RELIABILITY
OUR 60TH YEAR



This plane flies to the moon and back . . every day

Hundreds of rugged, dependable Beechcraft "Twins" serve business all year long. It's estimated that these company-owned Beechcraft Executive Transports fly a combined distance equal to a trip to the moon and back every day.

Management men rely on this soundproofed, superbly comfortable plane for the best of reasons: Its *use* saves them *money*, cuts travel-time as much as 75 per cent. These men take field trips they formerly "passed up"—coming and going at *their* convenience. They personally sell distant customers, solve problems on the spot. Investigate. Typical costs, operating data on request from your Beechcraft distributor or write Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

Royal Canadian Air Force Expeditor. Beech "Twins" will serve for pilot and navigation training, and communications work.

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Dust Respirators

GOOD, LIGHTWEIGHT, COMFORTABLE

In the "Good Old Summer Time"

A comfortable worker is a better worker! That's why these lightweight (1½ ounce) respirators are particularly welcome when temperatures soar. They do a real protective job and they're economically priced. Your nearest AO Safety Products Representative can supply you. Model numbers are R9100 and R9100T.

Recommended Uses

R9100 Respirator provides protection against pneumoconiosis-producing and nuisance dusts such as borax, carbon, glass, grain, graphite, cement, limestone, gypsum, coke, charcoal, wood, pollen, flour and aluminum.

R9100T Respirator, similar in appearance and construction to the R9100, protects against any toxic dusts not considerably more toxic than lead—such as arsenate of lead, barium, cadmium, and manganese. It also protects against DDT.

QUICK FACTS

Construction: Simple design includes a smooth, rubber face-contacting mask and a corrugated permanent type felt filter, reinforced by a wire frame.

Filter: Corrugated facepiece forms filter, giving large filter area of approximately 22 square inches.

Breathing comfort: Easy to breathe in — non-reversing, low-resistance exhalation valve does not stick, is out of way and easily replaceable.

Wearing comfort: In addition to light weight, comfort features include soft rubber, smooth edges and self-adjusting double headband.

Unobstructed visibility: Compact, fits close to face. May be worn under helmet or with goggles.

Easily cleaned: A vigorous shake, a slap of the hand or a light blast from an air hose removes dust.

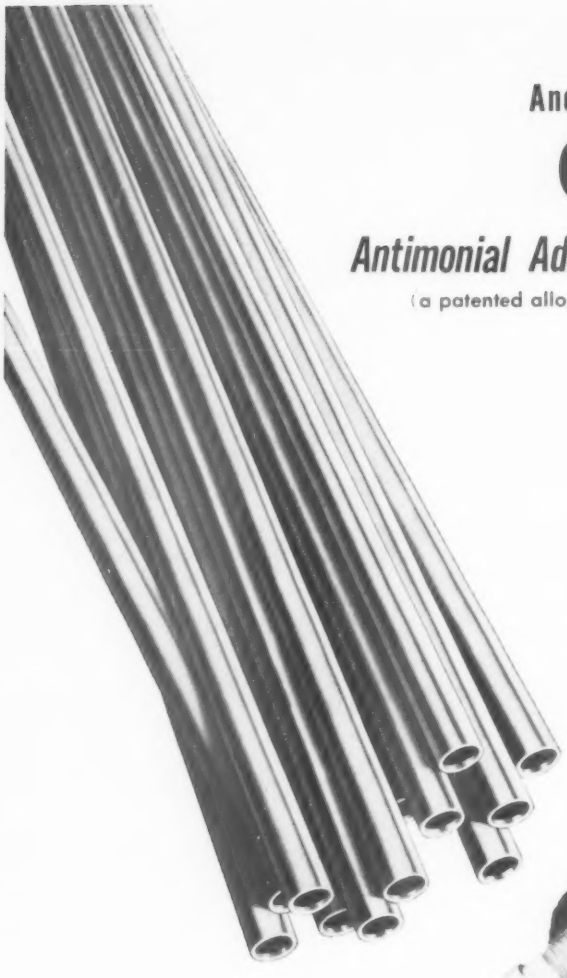
Both respirators are approved by the U. S. Bureau of Mines (R9100 — BM2137; R9100T — BM2144).

Look to AO for a complete line of safety goggles, protective clothing and respirators for every industrial need.

American Optical

SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



Another reason why

Chase

Antimonial Admiralty Tubes last longer!*

(a patented alloy)

Yes, you can *count* on Chase Antimonial Admiralty Heat Exchanger Tubes to give you many years of satisfactory service.

Chase Heat Exchanger Tubes are rigidly controlled for quality during manufacture, and various tests are applied when the tube is finished. The flattening test mentioned below is a good example. Wall thickness, diameter, surface finish, concentricity and accuracy of length are carefully determined.

So, for Heat Exchanger tubes that last and last, *remember:* insist on Chase Antimonial Admiralty!

*U.S. Pat. No. 2,061,921

PUTTING THE SQUEEZE ON IMPERFECTIONS...

This Chase technician is performing a "flattening test" which is an indication of soundness and freedom from hidden defects. You are assured that tubes passing this test will satisfactorily withstand bending or end flaring.

Chase BRASS & COPPER

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

CHASE WAREHOUSE STOCKS: NEW YORK, BALTIMORE, NEW ORLEANS, LOS ANGELES

Also carried by Vinson Supply Co., Tulsa, Standard Brass & Mfg. Co., Houston.

• *The Nation's Headquarters for Brass & Copper* Albany† Atlanta Baltimore Boston Chicago Cincinnati Cleveland Dallas Denver Detroit Houston Indianapolis Kansas City, Mo. Los Angeles Milwaukee Minneapolis Newark New Orleans New York Philadelphia Pittsburgh Providence Rochester† St. Louis San Francisco Seattle Waterbury †sales office only

For deeper penetration the Western Company uses DU PONT JET PERFORATORS

1. Tubing out, this deep West Texas well is to be perforated by The Western Company of Midland, using Du Pont Jet Perforators. Du Pont Jets give assurance of deep penetration into the pay zone for effective drainage.

2. Assembling a jet perforating gun on location after loading with Du Pont Jet Perforators. Du Pont Jets readily pierce one, two, or even three strings of casing . . . and well into the formation beyond the radius of mud damage.

3. A Western Company rigger guides the loaded jet gun into the shooting nipple over this deep well. The jet charges will function perfectly . . . even at bottom hole temperatures above 300°F.

4. Jet gun being removed from shooting nipple after successful perforating job. Western Company Shooting Engineers say that another fine feature of jet perforating is that each run of a jet gun loaded with Du Pont Jets . . . whether it is the fifth, tenth, or twentieth . . . is just as effective as the first run . . . equal efficiency and penetration are assured.

For maximum efficiency on *any* job of oil-well perforation . . . be sure to specify that Du Pont Jet Perforators be used by your service company. These Perforators reach out . . . bring in the oil if it's there . . . lead to maximum production. The Du Pont Explosives representative in your district will gladly give you complete information about Du Pont Jets. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

DU PONT EXPLOSIVES

Blasting Supplies and Accessories

DU PONT

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

TRADE PAPER EDITION
Published by
SCHUTTE and KOERTING
Company

ENGINEERING *News*

JET APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT • ROTAMETERS • FLOW INDICATORS • RADIAFIN TUBES • VALVES • SPRAY NOZZLES AND ATOMIZERS • GEAR PUMPS • DESUPERHEATERS

VERSATILE JET EDUCTORS BLEND OILS THE EASY WAY

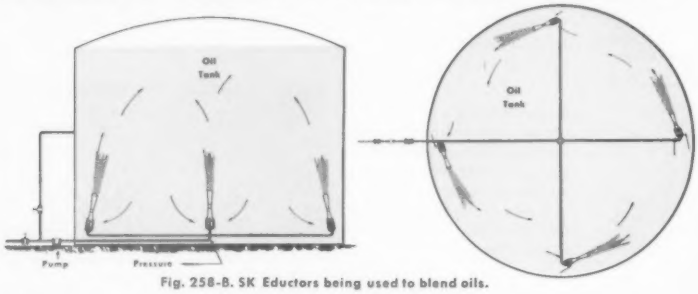


Fig. 258-B. SK Eductors being used to blend oils.

Applications of SK Jet Eductors include lifting, pumping, mixing, and agitating of liquids and the handling of solids and slurries.

Specifically, in the petroleum industry, they are currently being used in pumping and mixing operations in oil treating systems (such as sweetening-alkylation), for introducing anti-knock fluids and coloring matter into gasoline, and for continuous blending, acidifying, causticizing of oils, for removing spent filter clay, and for tank mixing and proportioning operations.

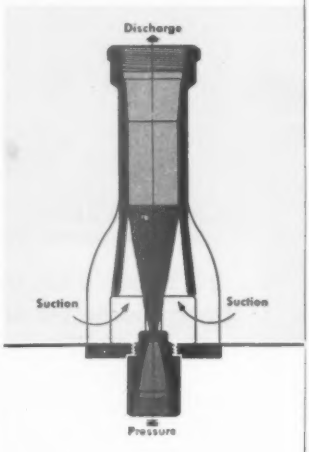
In all of these operations, jet eductors provide certain definite advantages—based, to a great extent upon the fact that they are simple in design and construction, require little maintenance or supervision and yet are very efficient.

A typical application is shown in Fig. 258-B. Here, five 8" SK Fig. 258 Internal Mixing Eductors are being used to blend, recirculate and agitate oils in a 100 ft. tank. Initially, transfer pumps are used to fill the tank through the eductors. As soon as the liquid submerges the eductor nozzle, blending begins. In this particular instance, the eductors are arranged to entrain 3 gallons of tank oil for each gallon of motive oil. Other ratios are possible.

As shown by the sectional drawing, Fig. 258, motive oil, under pressure, issues from the eductor nozzle and entrains oil from the tank. The two are thoroughly mixed in the eductor throat and are then discharged. After the tank is full, the mixing is completed and stratification is prevented by using the pump to recirculate oil from the top of the tank through the eductors where oil from the bottom of the tank is again entrained.

This illustrates but one of many uses for only one of many types of SK Jet Eductors. For other interesting examples of how eductors can be applied, request a copy of Bulletin 2-M.

Fig. 258. Photo and sectional view of an SK Internal Mixing Eductor.



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CHRYSLER

INDUSTRIAL ENGINE DIVISION

BUILDERS OF HORSEPOWER WITH A PEDIGREE

SALUTES THE OIL INDUSTRY FOR ITS CONTRIBUTION TO OUR COUNTRY'S PROGRESS AND PROUDLY ANNOUNCES THE SELECTION OF CHRYSLER POWER FOR A NEW ROLE IN THE PETROLEUM INDUSTRY...

STEWART AND STEVENSON'S NEW

offering these advantages:

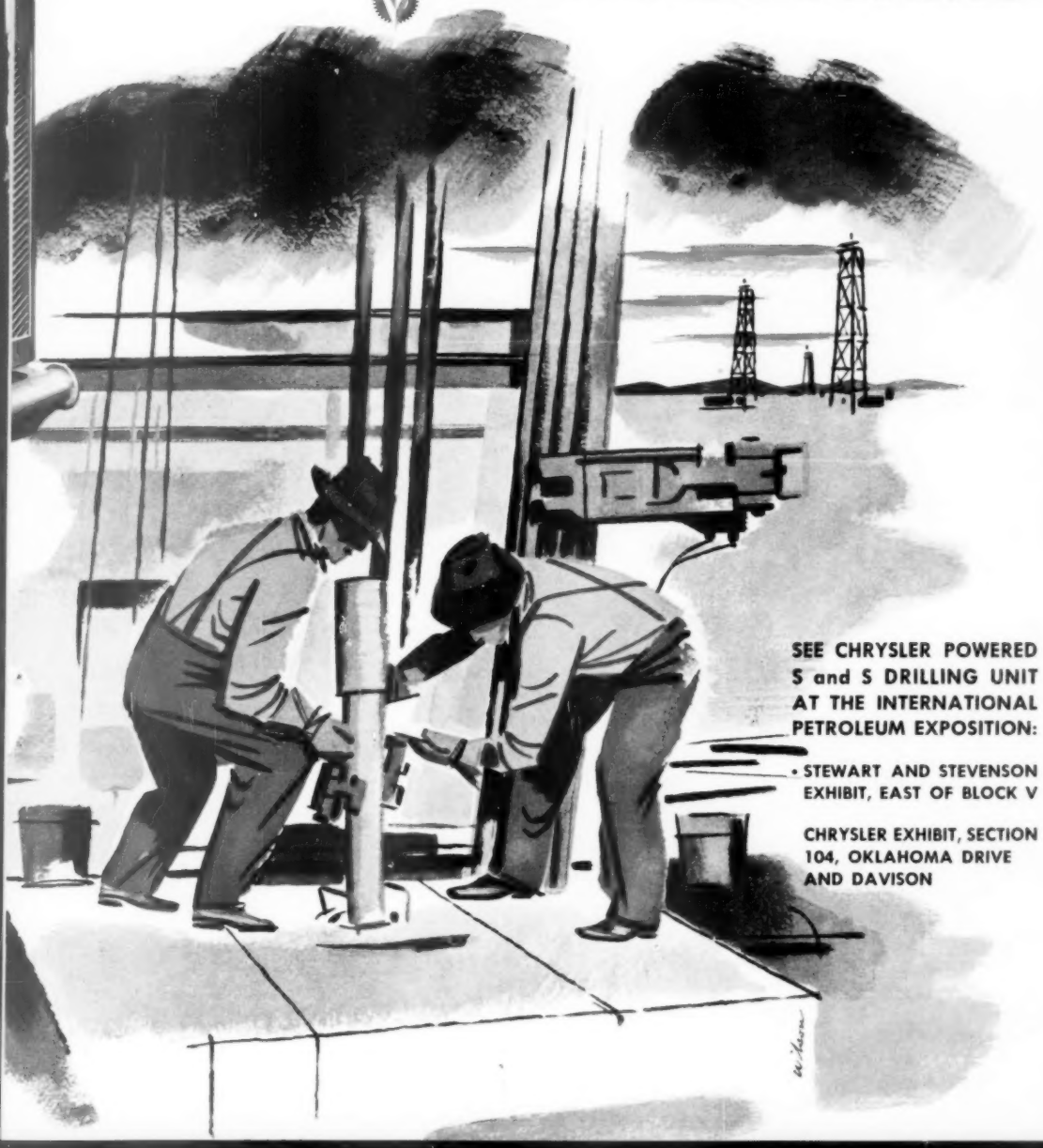
LOWER INITIAL COST—MORE HORSEPOWER PER EQUIPMENT DOLLAR INVESTED. The Stewart and Stevenson unit uses four standard Model 20 Chrysler V-8 Industrial Engines, all driving a common power take-off shaft. A standard Chrysler gyrol fluid coupling unit between each engine and the power transfer case, transmits the power of each engine smoothly to the drive shaft. The result is an oil field type heavy-duty power unit with greater usable horsepower than ever before offered at such low initial cost. Up to 500 maximum horsepower, 400 continuous horsepower.

LOWER MAINTENANCE COSTS, GREATER DEPENDABILITY. The multiple cylinder, short stroke principle of the Chrysler V-8 Industrial Engine permits operation at high rotative speeds with slow piston or frictional speeds. This results in longer life for pistons, piston rings and bearings. With reasonable care and proper application, the Stewart and Stevenson unit may be operated over periods of from 6,000 to 12,000 operating hours without major service. If major service is required, entire engines can be replaced *without* putting the balance of the unit out of action. Furthermore, the equipment manufacturer has an engine exchange plan whereby the cost of the new engine is reduced below the cost of a crankshaft on comparable gas engines.

GREATER FLEXIBILITY OF OPERATION, AMAZING OPERATING ECONOMY. When conditions require considerably less than the maximum horsepower of the unit, oil operators can reduce power simply by disengaging a friction clutch and cutting off one or more engines. This means that the fuel economy of the unit is just as good at low load as at full load. Thus, if properly operated, the unit, from low load to full load, and without compression ratio change, is more efficient than any other spark ignited 500 horsepower engine capable of burning either natural gas or butane fuel.

AMAZING HEAVY DUTY GASOLINE, NATURAL GAS, OR LP GAS DRILLING UNIT...

POWERED BY 4 CHRYSLER INDUSTRIAL ENGINES



SEE CHRYSLER POWERED S and S DRILLING UNIT AT THE INTERNATIONAL PETROLEUM EXPOSITION:

- **STEWART AND STEVENSON EXHIBIT, EAST OF BLOCK V**

CHRYSLER EXHIBIT, SECTION 104, OKLAHOMA DRIVE AND DAVISON

while at the CHRYSLER EXHIBIT,

see the engines that

every day are powering

more and more

of the products of

American Industry

CHRYSLER

INDUSTRIAL ENGINE DIVISION

TRENTON, MICHIGAN

GREATEST NAME IN INDUSTRIAL POWER

WHY SPECIFY
AXELSON SUCKER RODS?

Because they are heat treated from END to END.

Because they are normalized from END to END.

Because they are then strong, ductile, shock-resistant.

Because *there is no economical substitute for quality.*

Axelson sucker rods incorporate sixty years of experience by the world's largest designer and manufacturer of deep well pumping equipment. Your near-by J&L store has the size and grade you need, and is deeply interested in the satisfactory performance of your wells.

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ASK THE AEROFIN MAN

About Practical Heat Exchange

There is a competent Aerofin heat-transfer engineer near you—qualified by intensive training and long experience to find the *right* answer to your own particular heat-exchange problem—and backed by the research and production facilities of the pioneers in light-weight extended surface.

Ask the Aerofin Man.

Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

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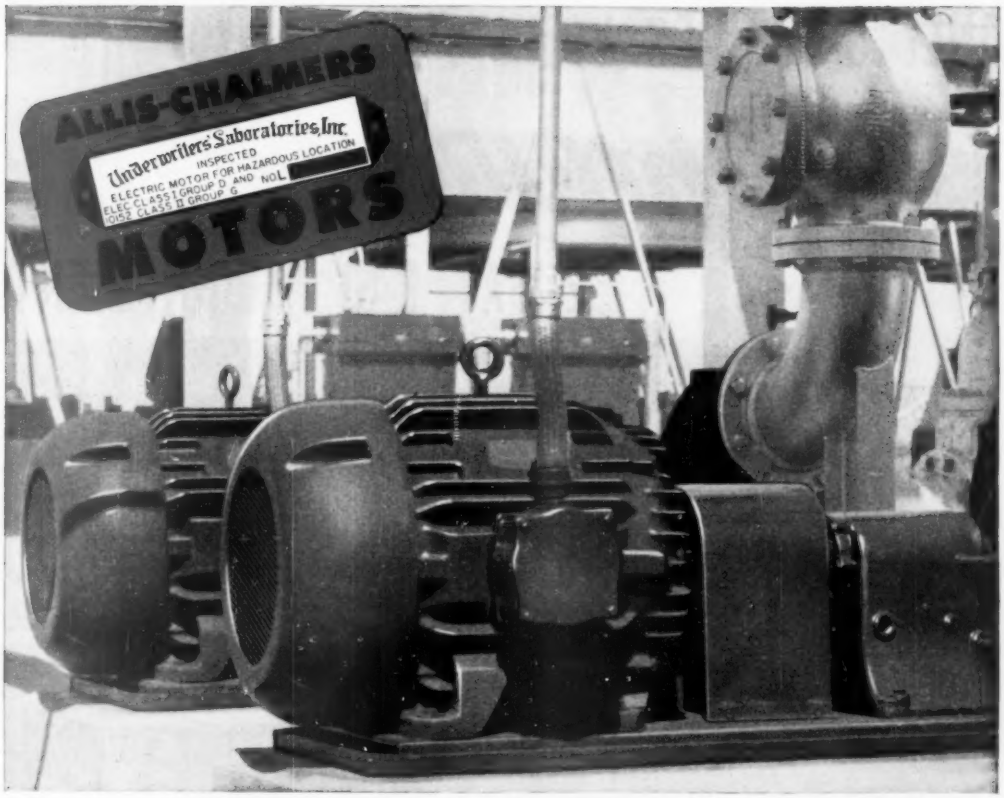


Get These 3 Low Maintenance Features

1 Wide Open Air Flow

No enclosed external air passages to clog. Easy to clean with cloth, brush, air hose or vacuum. Simply remove fan cover and whole radiating surface is exposed for inspection and cleaning.

2 Cast Iron Construction

Frame, conduit box and fan cover of cast iron resist corrosion. Fan is non-sparking, corrosion-resistant material. Well suited to outdoor operation.

Texrope and Vari-Pitch are Allis-Chalmers trademarks.

3 Pre-lubricated Bearings

Ball bearings are double-shielded type, pre-lubricated at the factory. Periodic lubrication is not required under normal operating conditions, but provision is made for in-service lubrication if necessary.

GET COMPLETE INFORMATION on Allis-Chalmers motors for oil field and refinery service—complete with Allis-Chalmers coordinated control — from your nearby Allis-Chalmers Authorized Distributor or District Office, or write for Bulletins 51B7286 and 51B7149. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3967

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

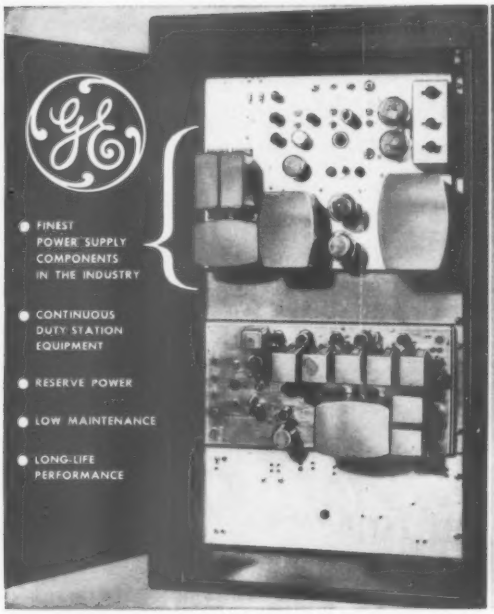
PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

ONLY G-E GIVES YOU...

24 hour duty

2-WAY RADIO EQUIPMENT



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YEARS OF ELECTRICAL PROGRESS

CALL OR WRITE FOR INFORMATION!

Get complete details on G-E Radio Equipment from our CAS* man. Call the local G-E office today or write: *General Electric Co., Section 853-4, Electronics Park, Syracuse, N. Y.*

*Communications Advisory Service

Only with G-E 2-way radio could you *actually* hold the button down for *24 hours* of continuous transmission and confidently know that *nothing will burn out.* Here's further proof of rugged G-E design and construction that provides dependable service in any emergency . . . *built-in reserve power* for normal drilling, pipeline, or refining operations!

Replace with G-E and get radio equipment designed for your industry's operations! General Electric, who pioneered in split channel development, offers low band units with *power to spare* for long-life performance . . . maintenance economy. These outstanding 2-way radio features explain why *the trend is to G-E communications equipment!*

See us at the International Petroleum Exposition in Tulsa!

GENERAL ELECTRIC

New Polyken Tape BEATS CORROSION

CORROSION CONTROL! Here's positive evidence in this photograph where a test section of pipe has been completely protected by Polyken Tape No. 900 while unprotected pipe is shown in advanced stages of corrosion.

Announcing a superior, exclusive Polyken Tape Coating to help you fight corrosion, reduce down time, give greater protection for more years at the lowest possible cost.

Here's the biggest news in corrosion prevention, of this or any year!

Polyken, long the leader in plastic Protective Tape Coatings for corrosion control, now presents Tape No. 900—a tough, easy-handling, low cost coating that offers greater protection for more years.

Polyken customers helped engineer this new coating—backed up our own 3½ years of product research with their own on-the-job tests.

Apply it by machine, or apply it by hand—either way, Polyken No. 900 goes on *fast*—in a one-step process requiring no heat, liquids, drying time, or clean-up time. Equally effective above or below ground.

Polyken No. 900, black (also available in gray, No. 910)—the new polyethylene plastic tape coating—is made by Polyken's own exclusive process. It's the latest in the line of Polyken Protective Coatings. Mail the coupon today for a free sample and more details.

Superior corrosion resistant qualities of POLYKEN'S Newest Protective Tape Coating

- **33⅓% THICKER FOR GREATER PROTECTION**
  - high puncture and abrasion resistance
  - high dielectric strength
  - increased tensile strength
- **MADE FROM ORIENTED POLYETHYLENE**
  - conforms to odd-shaped surfaces
  - superior moisture vapor barrier
- **NEW ADHESIVE MASS**
  - adhesion doubled
  - superior aging qualities
  - superior high and low temperature performance
- **AVAILABLE IN TWO COLORS**

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INDUSTRIAL TAPES

Department of Bauer & Black
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Please send me samples and further information on POLYKEN PROTECTIVE COATINGS.

Name_____ Title_____

Company_____

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Cut operating and service costs!

This FWD 6 x 6 Model MU, with integral derrick, lifts pipe out for cleaning and servicing, lowers it back when job is done.

Here is an FWD U series tractor loading drilling mud mixed with crude oil for access road surfacing. It also hauls heavy pipe and drilling equipment.

In the Michigan fields, this FWD is used to move six drilling rigs from well to well.

This FWD 6 x 6 provides high speed transport for heavy equipment and machinery despite frequent poor footing.

Handle more jobs with FWD heavy-duty oil field trucks

Whether you're about to replace some of your older trucks or looking for a rugged trouble-shooter, an FWD is the answer. That's because FWDs for oil-fields, pipelining and exploration give you all the advantages of true four-wheel-drive traction PLUS low maintenance.

Designed with the help of veteran oil men FWDs have *"built-in"* features that oilmen want. As a result, FWDs haul bigger loads, get through where other rigs fail, work more days per year, yet cut your service and maintenance bills.

To get the details, see your FWD dealer. He'll be pleased to help you select the FWD 4 x 4 or 6 x 6 model or models that meet your exact needs.

THE FOUR WHEEL DRIVE AUTO CO.
Clintonville, Wis. *Canadian Factory*: Kitchener, Ontario

An FWD 6 x 6 starts to lift pipe out of a well in the West Edmund field north of Oklahoma City. It has a portable derrick for servicing wells without a permanent derrick.

Built by the makers of America's Foremost Heavy-Duty Trucks

New wearproofing metal to protect parts against corrosion, erosion and abrasion...

...CARBOLOY GRADE 608 CHROME CARBIDE

Here is a created-metal which in tests has been outstandingly effective for combatting a combination of corrosive, abrasive and erosive agents – Grade 608 *Carboloy Chrome Carbide.*

Chrome Carbide (not a cutting tool metal) is fast proving itself suitable for wear-proofing applications. It is being tested for lengthening the life of equipment parts where acids, alkalis, heat, oxidation and the like are most troublesome.

Suggested spots for Chrome Carbide are in spray nozzles, steam valves and orifices for processing foods, soaps and drugs . . . valve balls, seats and bearings for oil refining . . . core pins for ceramic baking . . . plus countless other applications in many fields.

Perhaps *you* can use Chrome Carbide to advantage. Check the physical properties of this new metal.

For full details on characteristics, properties, applications and test results, mail coupon today.

PHYSICAL PROPERTIES OF CEMENTED CHROME CARBIDE (*GRADE 608*)

Composition: 83% Cr_3C_2
2% WC
15% Ni

Hardness: (nominal) $88R_A$

Density: (nominal) 7.0 gm/cm³

Transverse Rupture Strength: 100,000 psi

Abrasion Resistance: Much higher than steel, not as high as tungsten carbide.

Steam Erosion Resistance: Excellent resistance. It will outlast conventional tungsten carbide by 50 to 1.

Coefficient of Expansion: 4.9 x 10^{-6} in./in./°F (from 68°—248°F) 5.1 x 10^{-6} in./in./°F (from 68°—427°F) 5.3 x 10^{-6} in./in./°F (from 68°—608°F) 6.1 x 10^{-6} in./in./°F (from 300°—1800°F)

Corrosion Resistance: About 30 times the resistance of 18-8 stainless steel with sulphuric acid as the corrosive agent.

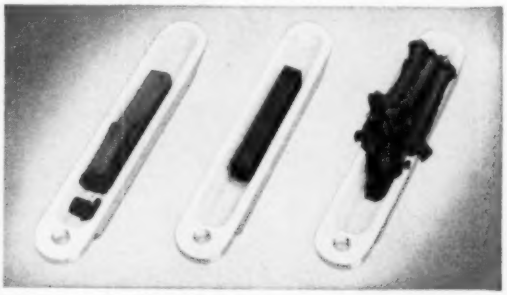
Electrical Conductivity: 2.2% of Copper

Electrical Resistivity: 80 michroms/cm/cm²

Magnetic Properties: Non-magnetic

Stability: Complete stability, with no apparent internal strains.

Oxidation Resistance: a) excellent up to 1000°C (1832°F). b) favorable, even beyond 2000°F.



WITHSTANDS GREAT HEAT: After exposure in air at 1850° F. for 24 hours, Grade 608 Chrome Carbide (center) is hardly discolored, while 18-8 stainless steel (left), and tungsten carbide (right) are all but disintegrated. Bars shown above were originally of the same size and shape.

GET CHROME CARBIDE TRY-IT-YOURSELF KIT

Test Chrome Carbide yourself! Kit includes: 3 bars ¼" sq. x 2"; 2 bars ¼" sq. x 1"; 3 bushings 5/16" I.D.; 1 rod, ⅛" dia. x 1" long. Price of kit . . . $10.75. Kit is adequate for conducting a wide variety of tests in your laboratory.

Visit Carboloy Booth 39-N,
North Extension, at the
International Petroleum Exposition and Congress
Tulsa, Okla., May 14th to 25th.

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY

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☐ Send me Chrome Carbide Technical Report CC-100 free of charge.

☐ Send me _____ Try-It-Yourself Kits of Chrome Carbide at $10.75 each.

Enclosed is ☐ Check ☐ Money Order ☐ Purchase Order

Send to _____ Position _____

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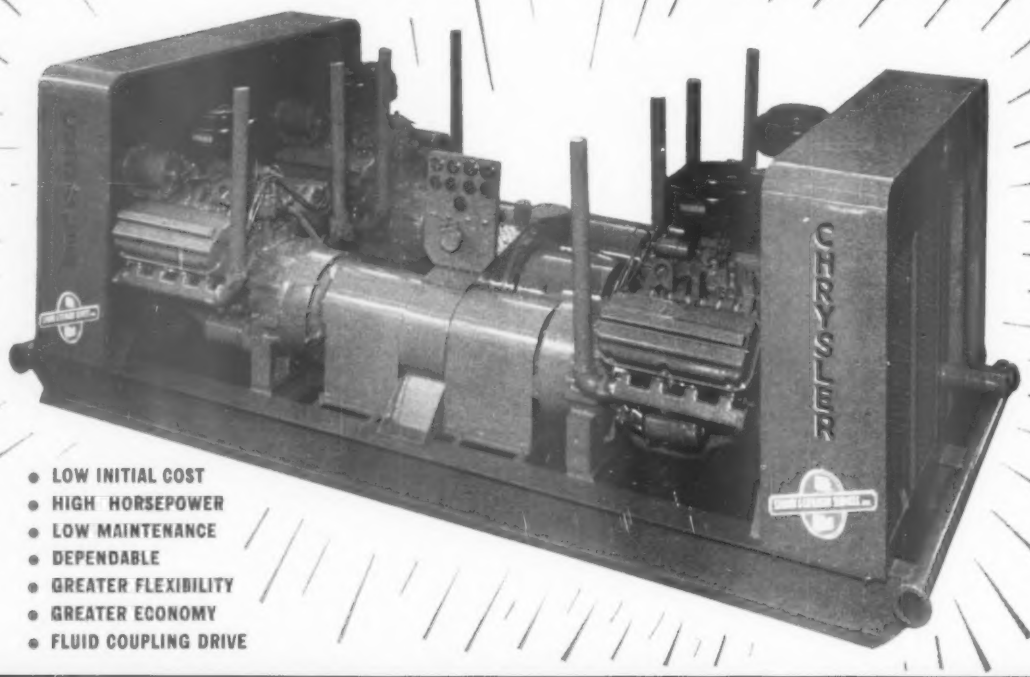
HERE'S REAL

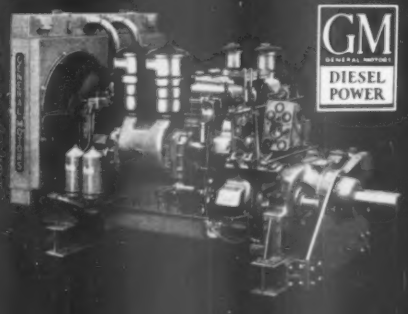
CHRYSLER

AGAIN PIONEERED



- LOW INITIAL COST
- HIGH HORSEPOWER
- LOW MAINTENANCE
- DEPENDABLE
- GREATER FLEXIBILITY
- GREATER ECONOMY
- FLUID COUPLING DRIVE

Completing the range of power offered to engine users, Stewart and Stevenson carries both General Motors Diesel and Climax Blue Streak engines and will assist in planning and engineering power installations for any use. Stewart and Stevenson's parts and service department is on call 24 hours a day to service these engines and all branches carry a complete stock of replacement parts. All engines sold by Stewart and Stevenson are backed by the famous Stewart and Stevenson guarantee of duty, which provides customer insurance of guaranteed performance on the job or full payment price is refunded.



POWER NEWS!

STEWART & STEVENSON HAS ANOTHER POWER PACKAGE

NEW Chrysler QUAD

The new Stewart & Stevenson Chrysler Quad is a heavy-duty gas/butane power unit consisting of four banks of 8 cylinders each driving a common power take-off shaft. This arrangement permits operation as a single 500 maximum horsepower power unit or, if desirable, where fractional loads are encountered, one or more of the four banks of cylinders may be clutched-out by merely disengaging a friction clutch. This arrangement makes possible the maximum in flexibility, fuel economy and dependability regardless of load factors.

ADVANTAGES

1. Low Initial Cost — High Horsepower

Never before has it been possible to offer so much usable horsepower in an oilfield type, heavy-duty power unit at such low first cost. The new Stewart & Stevenson quad unit utilizes current production, standard industrial Chrysler V-8 basic engines which make possible the lowest priced, practical, heavy-duty high horsepower unit. Maximum horsepower, up to 500 — continuous horsepower up to 400.

2. Low Maintenance and Dependability

The multiple cylinder, short stroke principle of the Chrysler Industrial V-8 engine permits operation at high rotative speeds with very slow piston or frictional speeds. This naturally assures longer piston, ring, and bearing life.

3. Flexibility and Fuel Economy

Unlike other single gas engines of comparable horsepower, the fuel economy of the Chrysler Quad can be just as good at a low load factor as at full load. Thus, if properly operated, the Chrysler Quad over the complete range from no-load to full-load is more efficient than any other spark ignition, 500 horsepower engine capable of burning either natural gas or butane fuel without compression ratio change.

4. Parts and Service

Following the Stewart & Stevenson tradition that "engines are no better than the parts and service behind them," careful attention has been given to the component parts on the quad unit. Principal wearing parts are available anywhere in the United States within a matter of one to three hours from practically any location.

SPECIFICATIONS

Number of cylinders	32
Bore and stroke	3 7/8" x 3 5/8"
Piston speed (at 2400 rpm)	1450 ft./min.
Maximum dynamometer horsepower, stripped engine	570
Maximum intermittent horsepower, (all equipment)	460
Continuous (24 hour per day heavy duty) horsepower	390
Engine RPM	2400
Output shaft rpm (standard 2 to 1 ratio)	1200
Maximum torque (standard 2 to 1 ratio)	2500 ft./lbs.
Weight with standard equipment	7000 lbs. approx.
Length overall	154"
Width overall	65"
Height overall	47"

Contact your nearest Stewart & Stevenson Services representative today for complete information on Chrysler Quad engines.

STEWART & STEVENSON SERVICES, Inc.

Main Office and Plant: 4516 Harrisburg Blvd., Houston 11, Texas. Phone WOodcrest 9691

Branches: Corpus Christi, Dallas, Lubbock, Wichita Falls, McAllen (San Juan), Odessa.

Representatives: San Antonio, Waco, Longview, Brownsville, Breckenridge.

Distributors of: General Motors Diesel Engines, Climax Blue Streak Engines, Chrysler Industrial and Marine Engines, Chicago Pneumatic Engines, Petter Diesel Engines, Red Head Pumps.

Fabricators of: Electric Power Units, Electrical Control Equipment, Portable Pumping Units, Truck Bodies.

PARTS... SERVICE

STEWART & STEVENSON SERVICES

Anytime Anywhere

THE NATION'S LARGEST DISTRIBUTORS OF GM DIESEL ENGINES

ALL FORGED STEEL

Edward
CHECK VALVES

for freedom from vibration, clatter and piping shock

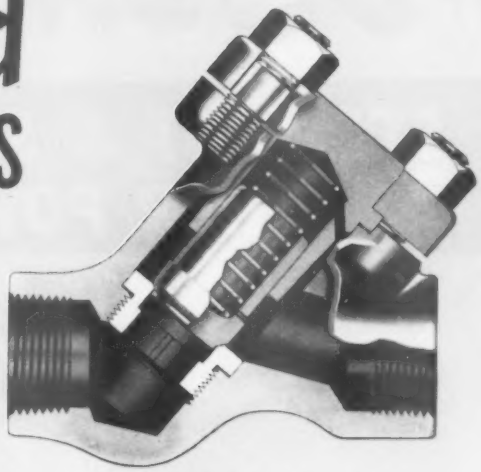


FIG. 4638,5538

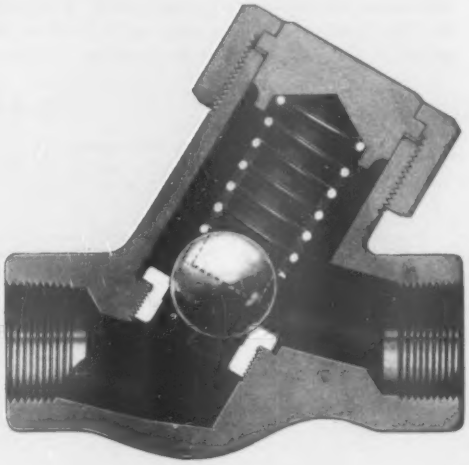


FIG. 2672,3572

For all piping systems requiring small check valves, Edward furnishes a complete line of forged steel valves in both principal check valve types:

PISTON TYPE CHECK VALVES for extra advantage in lines where it is important that the disk closes tightly upon the seat. Careful design of internal parts gives full flow area, low head loss, avoids excessive shock. Exclusive disk guide lip and spring loading for quick positive seating. Available with stellite contact faces on seat and disk on special order.

BALL CHECK VALVES are ideal where heavy viscous fluids are encountered. Bodies are of specially heat treated forged steel. The stainless steel ball of special EValloy high chromium stainless steel is guided by two steel ribs. A spring aids in seating the ball on the carefully lapped seat.

AVAILABLE IN WIDE RANGE OF SIZES AND STYLES

- √ 600, 1500 and 2500 lb sp pressure classes
- √ Horizontal or vertical types
- √ Screwed, flanged or socket welding ends
- √ Union, bolted or welded bonnet
- √ Ball or piston type disk
- √ In ¼", ⅜", ½", ¾", 1", 1¼", 1½" and 2" sizes

GET ALL THESE PLUS FEATURES:

- √ Extra strong and long spring of stainless steel for sure closing action
- √ Rated for 600 lb sp at 850F, 1500 lb sp at 850F and 2500 lb sp at 1000F
- √ Extra strong bodies of specially heat treated forged steel
- √ Cushioned closing action eliminates excessive vibration
- √ Fit any piping arrangement, vertical or horizontal
- √ Corrosion proof stainless steel seats and disks or balls
- √ Accessible removable seats
- √ Easy disassembly if needed
- √ Streamlined body contours for free flow, low pressure drop

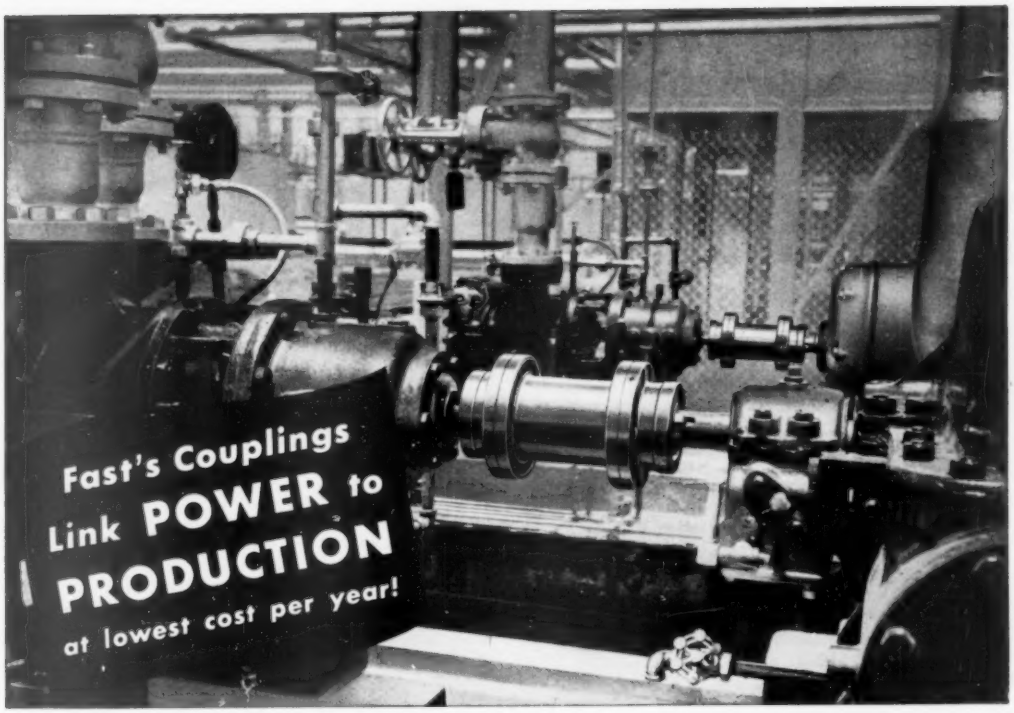
In addition to forged steel check valves, Edward builds a complete line of larger cast steel check valves—there is an Edward valve for every check valve application. Write for complete information.

Edward Valves, Inc.

Subsidiary of ROCKWELL MANUFACTURING COMPANY

1492 West 145th Street, EAST CHICAGO, INDIANA

Another Product



Every major producer of high-speed equipment uses FAST'S Couplings!

HIGH-SPEED equipment demands components with superior strength, accurate manufacture, long-lasting dependability. That's why it's important to *you* that Fast's Couplings are selected by every major high-speed equipment producer!

Fast s usually outlast the equipment they connect. Many have been in continuous operation for over 30 years, without trouble of any kind. And Fast's longer life saves you coupling dollars, too, because you amortize their cost over many years of trouble-free operation.

For full details on Fast's Couplings and Koppers Engineering Service, write today for your free copy of our catalog. Send to: KOPPERS COMPANY, INC., *Fast's Coupling Dept.,* 285 Scott St., Baltimore 3, Maryland.

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FAST'S
THE ORIGINAL
GEAR-TYPE
Couplings

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Here's How FAST'S Save You Money

Free Service—Koppers free engineering service assures you the right coupling for the job.

Rugged Construction—Fast's still maintains its original design, without basic change or sacrifice in size or materials. Result: freedom from expensive coupling failures.

Lowest Cost per Year—Fast's Couplings usually outlast equipment they connect. Their cost may be spread over many years!

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285 Scott St., Baltimore 3, Md.

Gentlemen: Send me Fast's Catalog which gives detailed descriptions, engineering drawings, capacity tables and photographs.

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HANCOCK

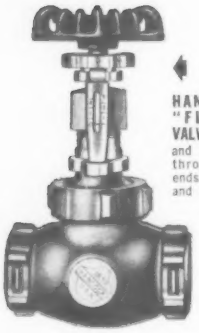
"FLOCONTROL" VALVES GIVE YOU PIN/POINT CONTROL

Here's manual control of flow, temperature and pressure that's really precise. Hancock "Flocontrol" Valves, with micrometer dial and pointer mounted on the bonnet, permit settings to within 1/100th turn of the handwheel! Equally important, any setting can be duplicated easily, perfectly — any time.

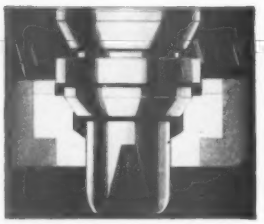
Hancock "Flocontrol" "3 in 1" design gives you the advantages of a variable orifice, plus a shut-off, plus an index . . . all in "one package." Bronze and steel types are available. Both have a scientifically designed V-Port valve disc that *compels proportional flow throughout the entire lift of the valve stem.* The shut-off seating surface is entirely removed and separate from the controlling V-Ports. Super-finished "500 Brinell" stainless steel seats and discs minimize the effects of wire-drawing and steam cutting.

For fine throttling control and proportional flow . . . for greatest efficiency, lowest operating costs — install strong, dependable Hancock "Flocontrol" Valves in your lines. Your nearby Hancock Distributor will gladly give you full details.

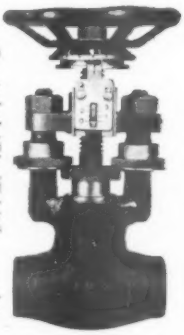
When Hancocks go in, valve costs go down



HANCOCK BRONZE "FLOCONTROL" VALVES. **Types:** Globe and Angle. **Sizes:** ¼" through 2". Screwed ends. Available in 150# and 300# Series.



HANCOCK 600# STEEL "FLOCONTROL" WELDVALVES. **Types:** Globe and Angle. Outside Screw and Yoke. **Sizes:** ¼" through 4". Screwed, Socket Welding and Flanged Ends. Available with 150#, 300# and 600# Series Flanges.



VALVE SEAT AND V-PORT DISC fully closed. As the valve is opened proportional flow is gradually increased. The Hancock "Flocontrol" Valve has straight-line flow. Its regulation does not depend on the short-wearing, fine threads common to a needle valve.

YOUR LOCAL INDUSTRIAL SUPPLY DISTRIBUTOR is as close as your nearest telephone. His 24-hour emergency service and large stocks of the finest supply items simplify your purchasing and save money for you.

HANCOCK VALVES

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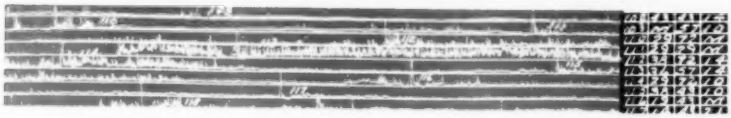
...only TUBOSCOPE calipers have the baseline



measures erosion
measures corrosion
measures rod wear

Only the Tuboscope Caliper with base line measures corrosion, erosion, and rod wear easily and accurately. The exclusive Tuboscope base line represents the nominal ID of the tubing. Wall reduction is interpreted readily from the chart by direct comparison of the activated line with the base line. By comparing the ID as shown by the base lines on charts for several surveys of one string of tubing, it is possible to determine whether the ID is increasing—an indication of erosion which no caliper feelers can measure. The easily understood interpretation tells you the exact condition of your tubing. Tuboscope surveys wells under pressure and up to 9,600 feet in one run at speeds up to 100 feet per minute. You can be certain that you know the tubing's condition after a Tuboscope survey. You don't need to pull good tubing. Call Tuboscope now to survey your producing wells.

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Pacific PRECISION BUILT PUMPS

The requirements for your specific service having been made known by your engineering specifications you will look carefully into the benefits offered by the various bidders. After looking, it's dollars to doughnuts your requisition will specify *"Pumps by Pacific"* because of the greater benefits of Pacific's *double assurance.*

Assurance that Pacific's design, workmanship and materials will fit the requirements of your specific service.

Assurance that Pacific's dependable fast service will fit your needs.

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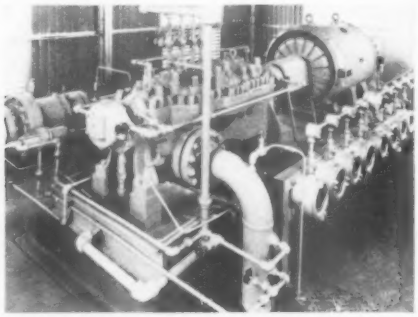
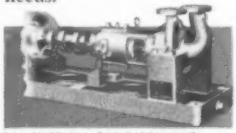
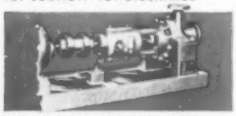


Pacific Pump Operated by Microwave—Unattended



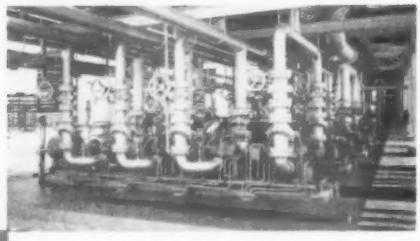
TOP SUCTION—TOP DISCHARGE



END SUCTION—TOP DISCHARGE

END SUCTION—SPECIAL DISCHARGE

Materials to fit your specific service:



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At each International Petroleum Exposition in Tulsa, Hyster Company furnishes a "Courtesy Karry Krane" for the use and convenience of all exhibitors. The pictures on this page, taken at Tulsa, show some of the things the Karry Krane does there, and the kinds of jobs you can call upon it to do. You'll find its versatility useful on the 101 jobs around your exhibit.

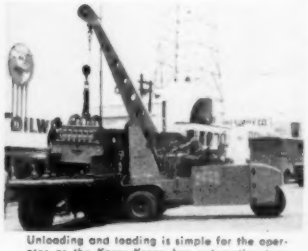
CAPACITY 10,000 LBS.

ATTENTION!

The Hyster Courtesy Karry Krane will be on the show grounds during installation of exhibits.

THERE'S PROFIT IN HYSTER POWER

Positioning of heavy units such as this Caterpillar Diesel engine is easy for Hyster Karry Krane, as counterweight is always behind load.



Unloading and loading is simple for the operator as the Karry Krane has automotive type controls.

Lifting heavy units out of packing crates—trunnion steering allows easy maneuvering.

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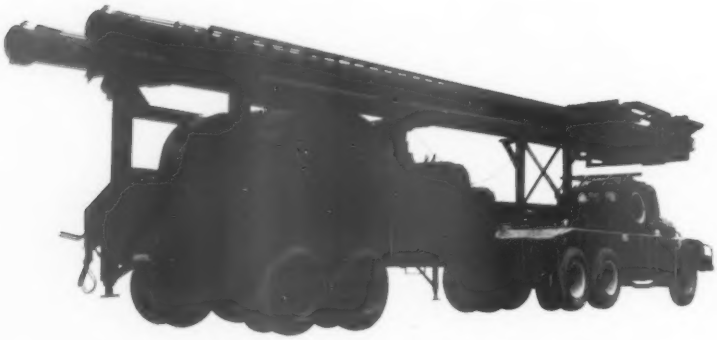
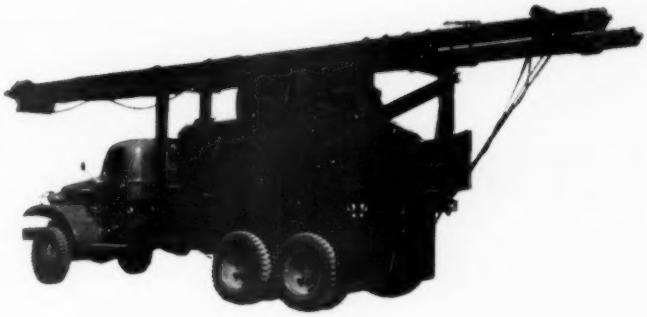


Cooper D-50 Trailer Unit with 91 ft. telescoping mast, rod hangers and tubing board for work-over and servicing the deepest wells. Designed for rotary drilling to 5,000 feet with 4½ inch drill pipe.



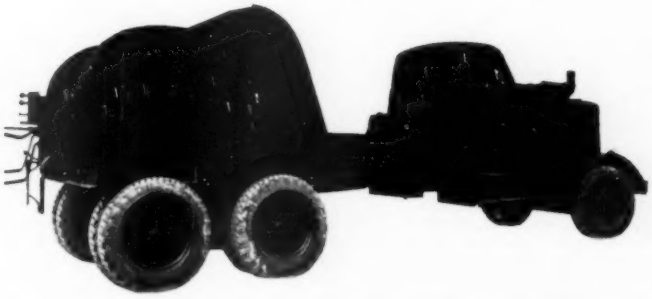
Cooper—Allis-Chalmers Model E-563 Double Drum Truck mounted well servicing unit.

...Invited.....

The entire facilities and personnel of the **Cooper — Allis-Chalmers** organization will endeavor to make your visit to the International Petroleum Exposition both profitable and pleasant.

During the show we would like for you to see the equipment on display at our exhibit and also to visit the plant and offices.

There are 30 models of single and double drum units in the Cooper—Allis-Chalmers 1953 line, consisting of skid winches, tractor winches, Self Propelled units and Trailer Rigs, with many combinations for Spudder and Rotary work. Also the complete line of Allis-Chalmers engines.



Cooper Model T-42 Self Propelled, Diesel Powered Work-Over and Servicing Rig designed for servicing to 10,000 feet and rotary drilling to 4,000 feet.

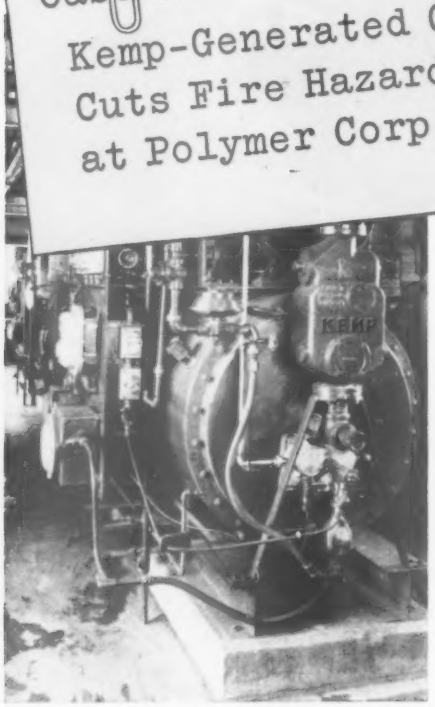
Since 1918, when Cooper built the first mobile well servicing unit, Cooper—Allis-Chalmers equipment has served the Oil Industry throughout the world.

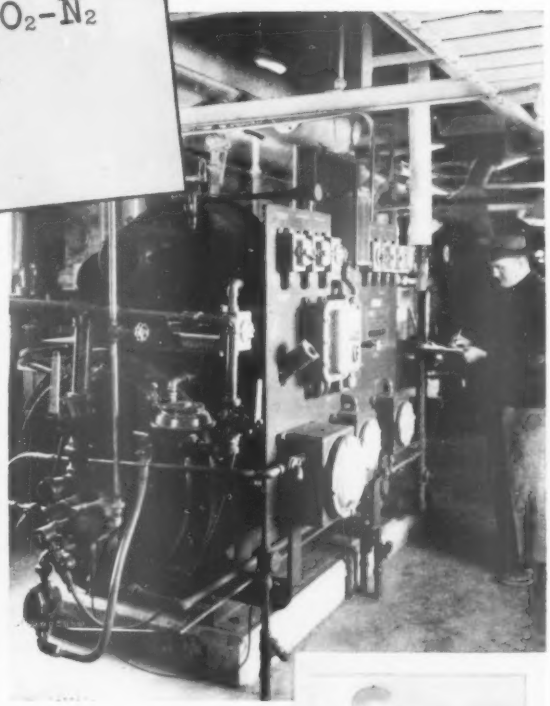
FRED E. Cooper, Inc.

P. O. BOX 1890 TULSA, OKLA.
Houston, Odessa, Los Angeles

Case No. 62

Kemp-Generated CO_2-N_2 Cuts Fire Hazard at Polymer Corp.





How Polymer operated day and night for 10 years at maximum safety

When Polymer Corporation, Ltd., Sarnia, Ontario, began operations in 1943, inventory included two Kemp MIHE Inert Gas Generators. Since that date, Polymer—and its Kemp equipment—has been operating 24 hours a day, 365 days a year. The huge quantities of man-made rubber and associated chemicals it produces—200,000,000 pounds during one year alone—reach, in one form or another, the four corners of the world.

Kemp Plays an important Role

The high volatility of many of the ingredients used in this giant operation necessitates blanketing and purging vessels after use. It is in this step that Polymer employs Kemp Generators to assure safe, trouble-free performance. The gas they produce is piped to different operations over the entire company area—it *must* be clean! Kemp does the job—Polymer knows that it can depend on Kemp to deliver a *clean inert at a specific analysis, regardless of demand*. And every Kemp Generator is engineered for fast starts and easy operations that save *time* and *money*.

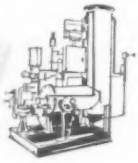
Kemp Can Do a Job for You

Kemp superiority is no accident. It is based on years of experience . . . on quality of design to meet specific problems. Every Kemp design features the Kemp Industrial Carburetor for complete combustion without tinkering or waste . . . for simplified installation and maintenance. Every Kemp design includes the latest fire checks and safety devices. If you have a blanketing or purging problem, contact Kemp engineers. They will be glad to study your situation and recommend the installation best suited to your needs. No obligation, of course.

Gas generator building from which inert gas is piped over 130 acres of company property at Polymer's Sarnia, Ontario, operation.

For more complete facts and technical information, write for Bulletin I-10 to: **THE C. M. KEMP MFG. CO., 405 East Oliver Street, Baltimore 2, Md.**

KEMP OF BALTIMORE



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CARBURETORS • BURNERS • FIRE CHECKS
METAL MELTING UNITS • ADSORPTIVE DRYERS
SINGEING EQUIPMENT

"Why all the different types and sizes of guns, Bill?"

"So we'll have the exactly-right equipment to do every job . . . even the impossible!"

"I'm not joking about that "impossible," Ben—we have guns and bullets to do jobs like perforating tubing or an inner casing string without damaging the outer casing. But that's a special job.

"You're more interested in regular, day-in, day-out work. Well, *that's* why the range of different guns, the different types of bullets, the different powders. Whatever the job demands, whatever the well conditions, either cased or open hole, we can put together a perforating combination, either bullet or Koneshot, or both, that's tailored to those conditions—a combination that gives maximum effectiveness and maximum safety. That's one good reason why Lane-Wells does the job *right*—the *first* time!"

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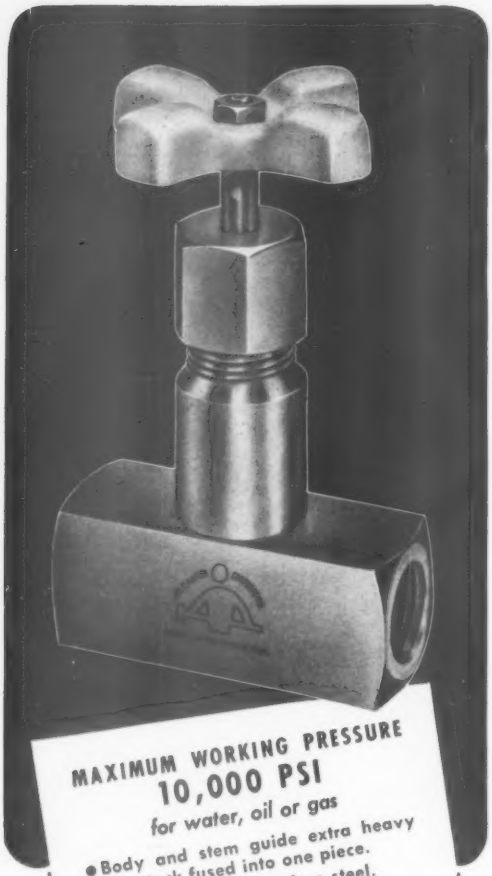
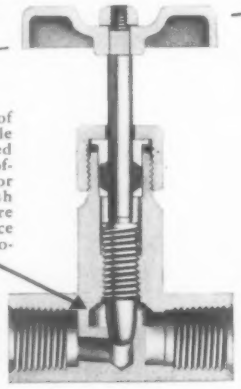


MAXIMUM WORKING PRESSURE
10,000 PSI
for water, oil or gas

- Body and stem guide extra heavy bar stock fused into one piece.
- Valve stem 416 stainless steel.
- Packing special one-piece "Marpak" moulded ring.
- Bodies marked in accordance with MSS regulations.



ONE PIECE

The stem guides of conventional needle valves are screwed into bodies—this often causes leakage or blow-outs. Marsh Needle Valves are fused into one-piece by exclusive "Conoweld" process.

Introducing—

The Ultimate in Needle Valves

Here is one of the crowning achievements of Marsh research, design, and manufacturing skill. It is the first needle throttling and shutoff valve to combine *all* of the qualities called for today in this highly critical and ever broadening field.

It is a valve that has strength and safety to spare . . . rated for pressures up to 10,000 psi—equally efficient in the lower ranges. A product of Marsh instrument-making and valve manufacturing experience, it combines instrument-like precision with the ruggedness that distinguishes all Marsh valve specialties.

The illustrations tell the story of new thinking; new standards. Body and stem-guide are machined from extra-heavy carbon steel bar stock. Still greater strength and rigidity are achieved by fusing the stem-guide into the body. The complete fusion of guide and body is accomplished by the exclusive Marsh "Conoweld" process.

There are two big advantages to this one-piece construction: (1) It eliminates the danger of unscrewing the valve from the body when opening—a frequent cause of leakage, even dangerous blowouts (2) It permits perfect line-up of threads and seat. As a result, Marsh valves are easier to operate even at high pressures.

The precision-machined stem is 416 stainless steel. Stem threads are fine pitch for extra strength and fine, controlled regulation. Notable advancements are special "Marpak" one-piece, non-binding longer-lasting packing; deep thread chambers, keeping inlet and outlet piping away from ports and contributing excellent flow characteristics. Entire packing nut and packing gland are electro-zinc plated, preventing corrosion and giving the valve a handsome, plated exterior. The rugged malleable handle is finished in heavy baked enamel.

The new needle valve line includes globe and angle patterns with double female connections in sizes ⅛", ¼", ⅜", ½", ¾" and 1". Also globe and angle valves with male inlet and female outlet in sizes ¼" and ½". *Complete stock carried at our Skokie, Illinois factory and also at our branch plant in Houston, Texas.*

Write today for catalog giving complete details.

MARSH INSTRUMENT CO. *Sales affiliate of Jas. P. Marsh Corporation*
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MARSH

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A Cordial Invitation
TO EXPOSITION VISITORS

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If you have an unusual fastening problem requiring individual attention, Metal Goods Corporation can furnish you with "specials", made up in any of the non-ferrous or stainless alloys.

If you need technical assistance in determining which type of fastening is most economical for you to use, Metal Goods Corporation offers you the capable counsel of highly-specialized metal men.

You may also be interested in securing Metal Goods Corporation's new Industrial Fastening Catalog. Engineers and Purchasing Agents who have examined it, say it is one of the most complete and easy-to-use catalogs that they have seen. Would you like a copy? No obligation.

Metal Goods Corporation also stocks most commercial forms of aluminum, brass, copper, monel*, nickel*, inconel*, stainless steel, and steel. When in need of metals or fastenings, call your nearest Metal Goods Corporation warehouse first.

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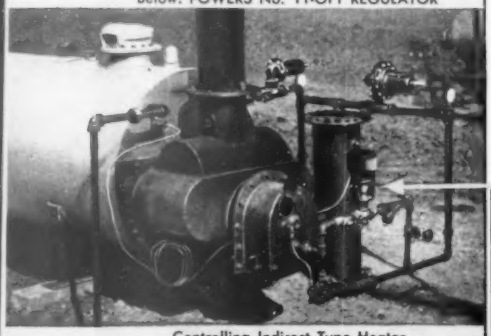
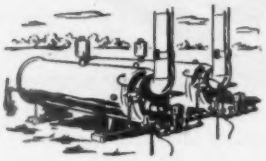
Want BETTER temperature control

For HEATERS and TREATERS?

Below: POWERS No. 11-OFT REGULATOR



Controlling Indirect Type Heater



(b20)

use

POWERS

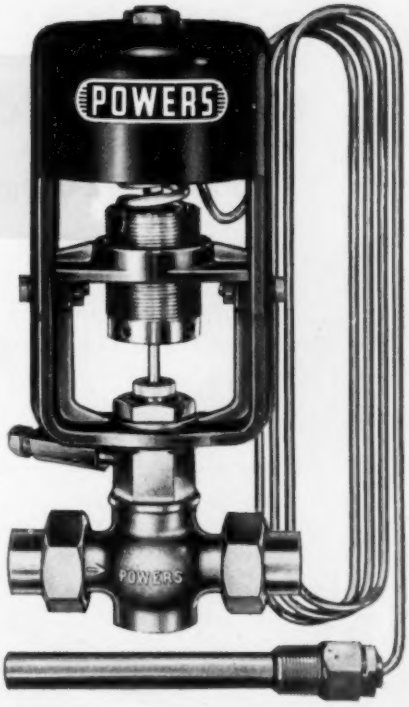
No. 11-OFT Self-Operating REGULATORS

★

They give long trouble-free service without repairs

★

No "freeze-ups" down to −60° F



Note these Features that Give Better Control and Lasting Reliability

1. Thermal system has OVER-heat protection. Powerful two-ply bellows and single seat composition disc valve assures tight shut off.
2. **Valve stem lubricator** helps give closer control, reduces packing gland troubles.
3. Rugged, built for long reliable service in all kinds of weather. Operate efficiently down to 60° F. below zero.
4. **Durable Valves** Sizes ¾" and 1" are direct acting, have single seat bronze body with double unions, for easy installation, composition disc and stainless steel seat.
5. **Temperature adjustment range:** 110 to 190° F., other ranges between 30 to 370° F.
6. **Bulb Well** is cadmium plated steel and extra heavy plain capillary tubing is 10 ft. long.

Powers No. 11 Temperature Regulators are backed by over 60 years experience making self-operating controls. They are used by leading manufacturers of heaters and treaters.

Service available from over 50 cities in the U. S. A., Canada and Mexico.

THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS • Offices in Over 50 Cities in U. S. A., CANADA and MEXICO

See Your Telephone Directory

OVER 60 YEARS OF AUTOMATIC TEMPERATURE CONTROL

WOLVERINE
Electric-Welded Steel Tube

Made by tube specialists with a background of over three decades of manufacturing and development of tube exclusively.

This extensive background, working constantly to close tolerances, presents a distinct advantage in manufacturing techniques which redounds to your benefit.

Another Wolverine technique that distinguishes this welded steel tube is the smooth finish on the I.D.

This tube is available to you in these analyses: SAE 1010, SAE 1015, SAE 1020, SAE 1025, SAE 1030, in sizes from ¼" to 3".

WOLVERINE
Customer Engineering Service

We suggest you make use of this valuable service any time you encounter tube problems or whenever you must consider applications that may be unfamiliar to you. Here at your command is a wealth of experience that can prove very helpful to you. It is yours without obligation.

This service encompasses the combined facilities of the following departments: Engineering, Technical Production, Product Development, and Sales—all ready

to answer questions concerning corrosion conditions and the proper choice of alloy, size and temper for such uses as heat transfer, tube fabrication, etc.

ESTABLISHED 1916

WOLVERINE TUBE DIVISION
of CALUMET & HECLA, INC.

Manufacturers of Tubing Exclusively

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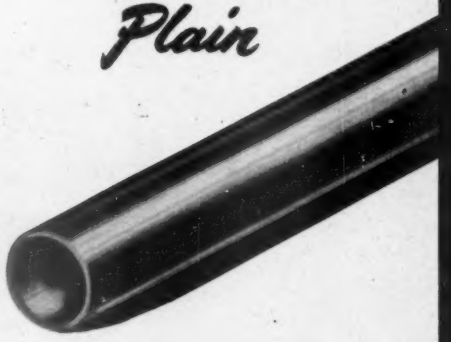
EXPORT DEPARTMENT, 13 E. 40TH ST., NEW YORK 16, N. Y.

WOLVERINE TUBING *Plain*



Wolverine tube possesses the greatest measure of *long-life-quality* that expert skill and years of experience can ever put into any tube.

And to make sure you will ultimately realize from your installation all the potential that Wolverine tube can supply, we suggest you ask our Customer Engineering Service to give you further assistance in the selection of tube of the proper alloys that will best meet your particular operating conditions.

Some of the most popular alloys: copper, cupro-nickel, brass, red brass, 70-30 brass, Muntz metal, aluminum and electric welded steel.

WOLVERINE TRUFIN* *Finned*

Trufin is a unique finned tube distinguished by its integral fin construction. With its fins extruded right from the tube wall, the tube, you see, is one

piece of metal, and consequently cannot be affected by vibrations or sudden temperature changes.

Nominal sizes range from ⅜" to ¾" root diameter. Furnished with thick-walled plain ends to permit best assembly.

Alloys available: copper, cupro-nickel, red brass, admiralty, aluminum, aluminum-brass, SAE 1010 steel, and stainless steel.

*REG. U.S. PAT. OFF.

Wolverine Trufin and the Wolverine Spun End Process available in Canada through the Unifin Tube Co., London, Ontario.

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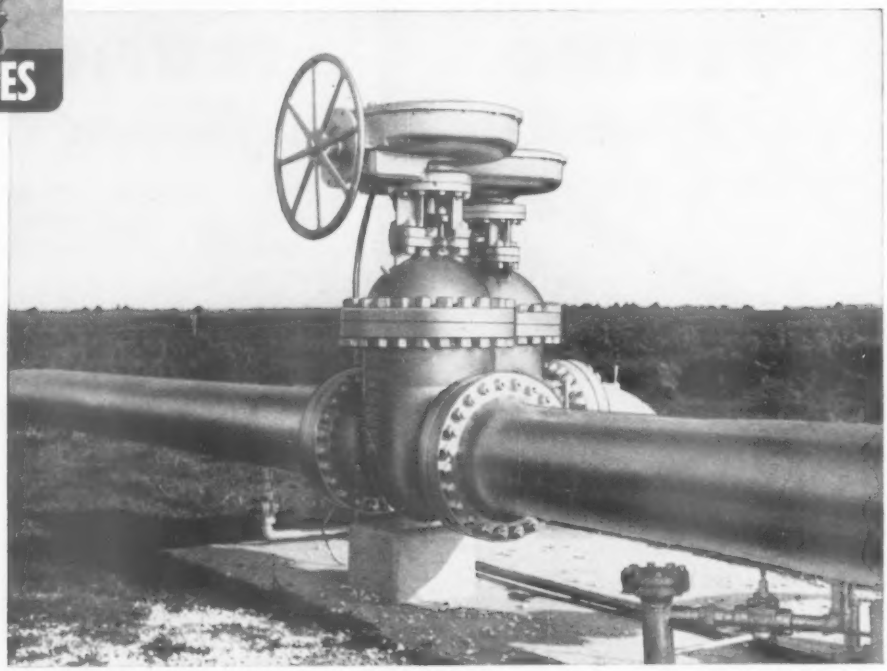
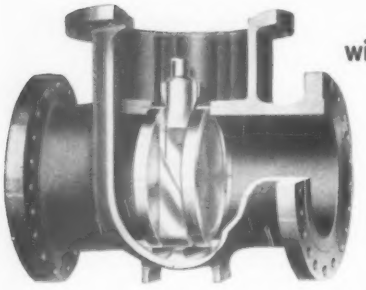
DARLING
DARLING
VALVES

FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN



Above: A pair of Darling 20" cast steel gate valves, equipped with bevel gear and gear case, installed on a major oil line. Because of tight closure and trouble-free performance in general, Darling fully revolving double disc parallel seat valves win favor on line after line.



Cutaway view showing complete simplicity of the Darling fully revolving double disc, parallel seat cast steel gate valve. Just four simple working parts . . . two interchangeable, no-pocket discs and two husky wedges. Maintenance is easy, assembly foolproof. Full seat opening allows free passage of line scrapers.

with Darling revolving double disc parallel seat gate valves

You can count on tight closing!

YOU can't entirely avoid valve body distortion in pipe line service. No matter! Darling's compensating wedge principle *automatically* adjusts for seat misalignment! Moreover, the gate discs, independently hung and free to revolve fully, change their seating position at each closing. This means *uniform* wear distribution. The valves work better and last longer, require less attention, less maintenance! And *you* avoid headaches.

SEND FOR DATA

Darling fully revolving double disc gate valves come in a wide range of types and sizes for main line, gathering, manifold, tank farm and all other gas and oil line services. Outline your particular service needs or ask for complete descriptive bulletin.

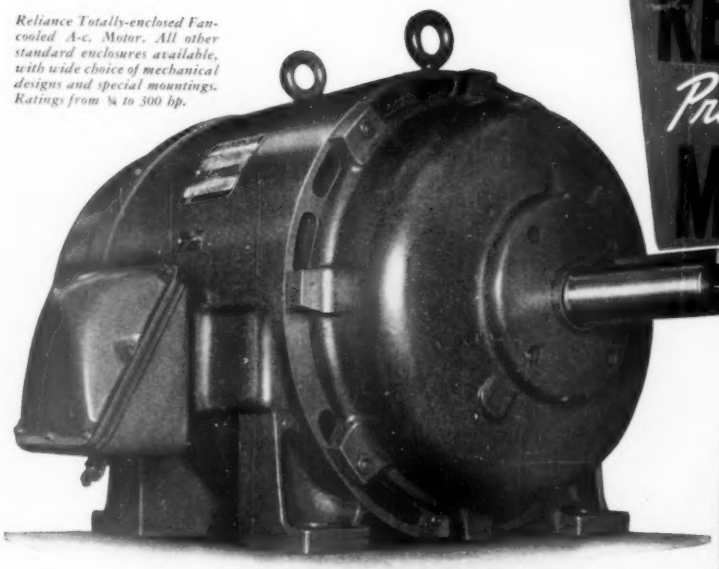
DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

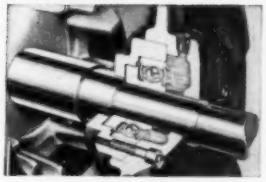
Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

DEPENDABLE...because they're ENGINEERED FOR OIL-WELL PUMPING

Reliance Totally-enclosed Fan-cooled A-c. Motor. All other standard enclosures available, with wide choice of mechanical designs and special mountings. Ratings from ¾ to 500 hp.



RELIANCE *Precision-Built* **MOTORS**



- ☆ Heavy shafts, bearing to bearing.
- ☆ Indestructible pressure-cast rotors.
- ☆ Shock-resistant frame and bearing-bracket construction.

See the RELIANCE MOBILE DISPLAY UNIT at the PETROLEUM EXPOSITION Tulsa, May 14-23, 1953

WHY THE RELIANCE PRE-LUBRICATED BEARING DESIGN IS BEST

The Reliance pre-lubricated bearing provides *four times more operating hours without re-lubrication* than any other bearing used in motors today. And—whatever your lubrication schedule—*you just can't grease 'em wrong!* To get the complete "inside story" on motor bearings, write today for Bulletin B-2201. It contains hard facts on the advantages of the Reliance pre-lubricated bearing design, with cutaway view, cross-section diagram, comparison chart, and statements by bearing manufacturers. B-1402

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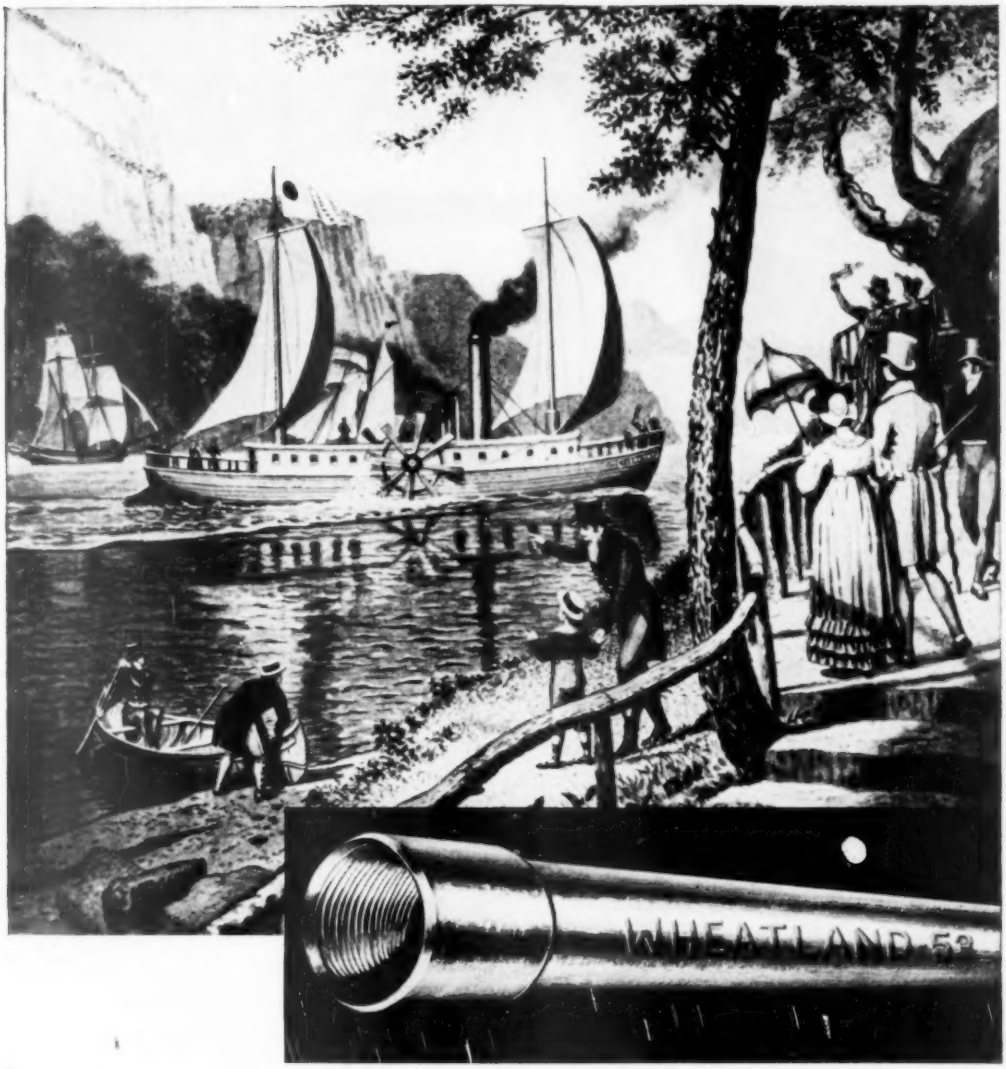


PIPE WITH THE YEARMARK

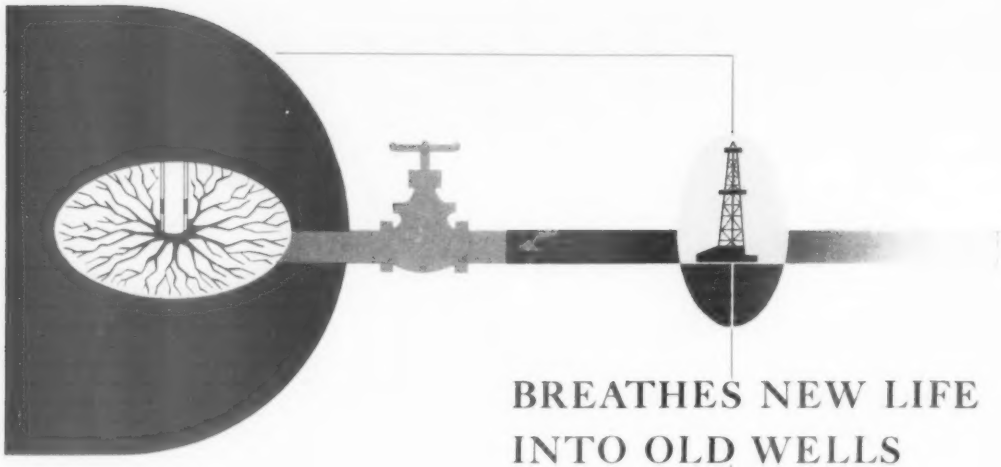
IMPORTANT DATES IN HISTORY

When Robert Fulton's "Clermont" first appeared on the Hudson River in 1807, she was looked upon as a miracle of engineering. Today, America is still in the fore with the most modern ocean liner.

The same skill, enterprise and devotion to perfection can still be found at Wheatland's, where every pipe carries its date of production to give assurance of the latest improvements. Ask for Wheatland "the pipe with the yearmark".

WHEATLAND TUBE COMPANY

Bankers Securities Building, Juniper & Walnut Streets, Philadelphia 7, Pa.



BREATHES NEW LIFE
INTO OLD WELLS

HALLIBURTON'S HYDRAFRAC SERVICE

When flow of oil dwindled to a trickle a few years ago, wells and even entire fields were abandoned. Now, however, an increasing number of these lethargic holes have again become potent producers. The agent that turned the trick was Halliburton's Hydrafrac Service.

The outstanding ability of Hydrafrac treatment to breathe new life into old wells and create new permeability in limited producers is a notable contribution to the industry. Since it became commercially available in 1949, Hydrafrac Service has been used in literally thousands of wells to create pay crevices and boost productive flow.

Operators also use this powerful hydraulic fracturing agent and Halliburton's multiple related services as a completion process for *new* wells. They find it more economical to let Hydrafrac Service crack pay formations while the rig is over the hole, postponing the time when extra stimulation is required.

Expert analysis of hole data and formation permeability by Halliburton specialists has contributed heavily to the success of Hydrafrac Service. This skilled interpretation – backed by years of experience – is one reason why 75% of more than 9,000 Hydrafrac-treated wells responded with an *additional* oil recovery averaging 175%.

Your nearby Halliburton representative has the facts on how Hydrafrac Service can assist you in reviving old wells and creating extra permeability as a new completion process. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

YEARS AHEAD IN PRODUCTION IMPROVEMENT TECHNIQUES

Here's performance you can count on

RCA 2-WAY RADIO

Straight-Forward Circuits to bring your message in without interference—even when you're operating close to an adjacent-channel transmitter.

Automatic Modulation Control to lower loud voices, raise weak voices, to correct level, without distortion.

Long Tube Life for dependable, low-maintenance service. Half the tubes operate at 1 5 maximum ratings.

Full Frequency Range: Fleetfone 30-50 mc, Carfone 152-174 mc.

Fits Anywhere: Transmitter-receiver unit takes no more space than a spare tire, mounts in any position, operates at low drain on 6- or 12-volt battery.

Stable Performance for minimum distortion. Ovenless crystals stay on frequency without warm-up, without wasting stand-by power.

Single-Case Construction for easy tuning and servicing. Offers plenty of protection—makes chassis and all components instantly accessible.

For Extra Dependability, installation and service facilities of the RCA Service Company are available.

* * *

For Complete Details on RCA 2-Way Radio contact the Communications Specialist at your nearest RCA Office or MAIL COUPON NOW.

RADIO CORPORATION of AMERICA
COMMUNICATIONS DIVISION **CAMDEN, N. J.**

Radio Corporation of America
Communications Division
Dept. 89Q, Building 15-1
Camden, N. J.

Please send me information on RCA 2-Way Radio
☐ Carfone ☐ Fleetfone
☐ Have RCA Representative call

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Address_____

Company_____

City_____ State_____ Zone_____

FOR FAST, DEPENDABLE SERVICE ON OIL FIELD EQUIPMENT AND SUPPLIES

Whatever your needs are in oilfield supplies
There's one place to get them without useless tries,
Just contact the nearest of our numerous stores
For—midday or midnight—we ne'er "close our doors."

From rig tip to drill bit, betwixt and between,
We carry each item of which drillers dream,
And when down-time's your headache just give us a try;
When Speed can mean Dollars It's "UNITED SUPPLY."

Uncle Sandy Says: *There's more truth than poetry in this!*

COURTESY • SERVICE • DEPENDABILITY

YOU CAN RELY ON UNITED SUPPLY!
UNITED SUPPLY

UNITED SUPPLY

AND *Manufacturing* COMPANY
TULSA, OKLAHOMA

Stores in KANSAS, OKLAHOMA, TEXAS, LOUISIANA AND NEW MEXICO

They Say—

"Shifts in Petroleum Transportation"

". . . Today America has a vast, complex, modern petroleum-transportation system. There are ample ocean tankers. . . . There are many lake tankers . . . a fleet of tank cars of from 4,000 to 16,000 gal. capacity . . . a fleet of modern barges. . . . There are thousands upon thousands of tank trucks that can handle from a few hundred gallons up to 7,000 gal. each trip, and more than 163,000 miles of petroleum pipe lines. . . .

"All this is evidence of real progress.

"Over the years . . . one form of petroleum transportation has had to surrender its former preeminence to another, just as the kerosine lamp has had to give way to the electric light and the horse and buggy to the automobile. In achieving the progress somebody had to lose, but the nation as a whole has gained.

"America must always go forward, be strong, and prepared to meet any eventuality. Our present petroleum-transportation system is a well-functioning machine and appears capable of doing an outstanding job in contributing to the advance, the strength, and preparation for emergency."

John E. Boice, special assistant to the director, supply and transportation division, Petroleum Administration for Defense, before the National Petroleum Association, Cleveland.

History Is Repeating Itself

Sir:

In 1907 Gov. Pinchot of Pennsylvania launched a vicious attack upon Secretary Ballinger of the Department of the Interior, alleging that Ballinger was permitting the Guggenheims to steal the "immensely valuable" government-owned coal in the Bering River area, Katalla Bay, Alaska.

At that time I was with a survey party projecting a railroad into that coal prospect. I saw that the coal was badly crushed by earth forces making it uneconomic to mine and impractical to transport to market. Meantime the "Ballinger-Pinchot Controversy" raged fiercely, the governor succeeding in making the Secretary very unpopular with the public. Among the latter was Harold Ickes who years later published a humble retraction.

The Guggenheims became disgusted and quit the project to the hurt of many Alaskans. That was 47 years ago. Ballinger died of a broken heart and

For Temperature Control

$35 Nicholson Trap Replaces $200 Unit

Again demonstrating their remarkable effectiveness as a low-cost temperature control, a large processor reports Nicholson expansion steam traps, at about $35 each, are being installed on outdoor tanks and stills in place of temperature controls. These were costing $110.00 to $200.00, with cost of trap added.

The Nicholson traps are readily adjusted to pass condensate at any temperature below 212° F. No air binding. Lengths 9" to 40". Easily installed, usually without supports. Pressure, 0 to 250 lbs.

For All Equipment Using Steam or Hot Water

Dryers, Evaporators, Heat Exchangers, Heaters, Kettles, Paper Machinery, Pipe Coils, Radiators, Retorts, Separators, Steam Stills, Storage Tanks

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W. H. NICHOLSON & CO.

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PAGE FENCE – *Since 1883*

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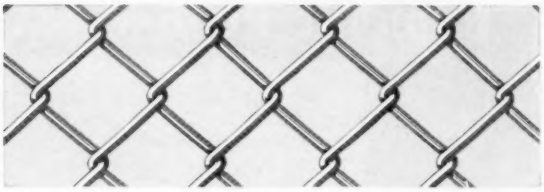


EVERY STEP IS QUALITY CONTROLLED— FROM RAW METAL TO THE ERECTED FENCE

• Page *Chain Link* Fence, pioneered by PAGE and produced only by PAGE, offers reliable protection against hazards which threaten both property and persons.

YOUR CHOICE OF THREE SUPERIOR METALS is assurance that your fence will best meet your needs. Choose heavily-galvanized Copper Bearing Steel, or long-lasting Stainless Steel, or corrosion-resisting Aluminum. Interlocking wires are woven to form a strong, uniformly square mesh.

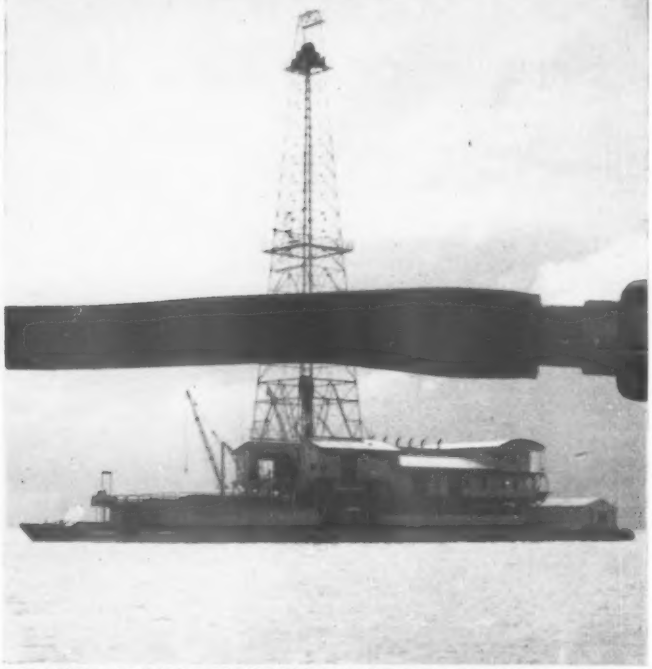
EIGHT BASIC STYLES, varied by choice of metals, wire gauges, heights, types of gates, posts and post tops, and top rails. Tension and fabric bands not removable from outside. Gate frames welded at joints.

IT'S TIME TO THINK, AND ACT. Page Fence is expertly erected by technically trained firms conveniently located throughout the country. For illustrated PAGE data and name of nearest firm . . .

Write to PAGE FENCE ASSOCIATION in Monessen, Pa., Atlanta, Bridgeport, Chicago, Denver, Detroit, Los Angeles, Philadelphia, New York or San Francisco.

PRODUCT OF PAGE STEEL & WIRE DIVISION OF AMERICAN CHAIN & CABLE COMPANY, INC.

off shore, but on schedule



BLIND PASS DRILLING BARGE EQUIPS WITH

Republic Rubber Hose

Six miles out over salt water is no place for trouble. So Charley Albright, tool pusher for Richardson & Bass Drilling Company, had the job done right. Stem to stern he equipped with tough, dependable Republic Rubber Hose . . . Champion Rotary Drilling Hose with streamlined, boltless couplings, flexible Republic Suction and Discharge Hose and a special Republic Mud Discharge Hose that can be raised at will to eliminate rewelding of pipe when extra blowout preventers are installed. Republic Hose is on the job for Richardson & Bass. Republic Hose should be on the job for you! Get the facts today!!

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P. O. Drawer 2481, Tulsa 2, Okla.

to this day nobody else has had the nerve to tackle that Bering River coal, even though it were a gift.

Next, we had Teapot Dome. That alleged steal of the people's oil has not netted the Government the cost of the paper used in scandalizing the issue.

Now it is offshore oil and history seems to be repeating itself. Consideration of the subject has been taken outside the oil industry which has been unable to debunk the popular idea that the producible offshore oil is of fabulous value.

When the cost of finding and producing deeply buried oil under deep and storm-tossed waters is taken into consideration, there are plenty of practical oil men who would reason that it is pretty much like producing the Bering River coal under difficulties; not worth the flutter.

Thomas M. Galey
Owensboro, Ky.

Interesting Possibilities

Sir:

The article on High-Pressure Gas Injection in your April 6 issue suggests interesting possibilities for the combination of refinery operations with oil production. The cracking of heavy oils for the production of motor gasoline gives as byproducts gas (comparable to natural gas) and intermediate hydrocarbons such as propane and butane.

By use of the refinery gases and the intermediate compounds it would seem possible to make the repressuring gas miscible with the reservoir oil in some cases in which the natural gas supplies would be inadequate. As discussed in the article, this will increase the ultimate recovery of liquid hydrocarbons.

George Gibson
110 Montclair Ave.,
Montclair, N. J.

Prompt Delivery—Always!

Sir:

I hold no brief for the Post Office Department, and am not the least bit reluctant to condemn government agencies when their performance justifies such criticism. I also have nothing to "holler" about concerning delay in receipt of your highly valued "yellow book," but feel constrained to acquaint you with my experience as it relates to your editorial in the April 6 issue under the caption "The P.O. vs Us"—this without regard to politics, no matter which party might be in control of our Government.

As your records will show, I have been a subscriber to your Journal for many years and must say that I have not had the slightest reason for complaining about delays in its deliveries.

It almost invariably is on my desk early Monday morning; and, as indicated, I have read the current issue thoroughly and it now is in the hands of our general purchasing agent. I suspect that your surveys of postal delivery service have contributed largely to my pleasant experience, but regardless of the individual or individuals to whom credit is due, the fact of the matter is that I take my hat off to him or them for doing a fine job.

J. M. Sitler
Director of Purchases
Esso Standard Oil Co.
New York, N. Y.

Benefits From Research

"G-M scientists and engineers spend months and even years in research and in the development of new products and processes. At the research laboratories division, for example, work is continuing as it has for the past 30 years on means for utilizing fuels more efficiently."

"Substantial benefits from this research have already been realized in the greater efficiency and operating economy of the new higher compression automobile engines. As higher octanes become available in the future, the results of this work will be reflected in further engine design changes with even further improvements and advances in performance and economy."

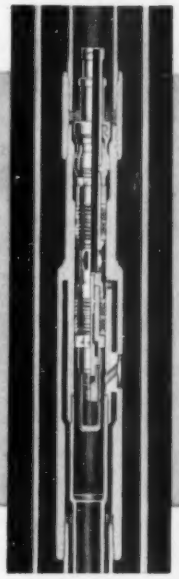
From General Motors Corp. 1952 annual report.

CALENDAR

MAY

5- 6	Gas hydrate control conference, University of Oklahoma, Norman.
6- 8	American Society of Training Directors, ninth annual conference, Sheraton Plaza Hotel, Boston.
7- 8	American Petroleum Institute, Rocky Mountain district, Division of Production, spring meeting, Gladstone Hotel, Casper.
8	Society of Exploration Geophysicists, Pacific Coast Section, annual spring meeting, Hotel El Tejon, Bakersfield, Calif.
8- 9	New Mexico Geological Society, annual meeting, Roswell.
11-12	American Gas Association, accident-prevention conference, Jung Hotel, New Orleans.
11-13	Southern Gas Association, Jung Hotel, New Orleans.
11-14	American Petroleum Institute, Division of Refining, midyear meeting, New York.
13-14	Pacific Coast Gas Association, annual gas supply and transmission conference, Santa Barbara, Calif.
14	Conference on Instrumentation in Water, Sewage, and Industrial Waste Treatment, Manhattan College, New York.
14-23	International Petroleum Exposition, Tulsa.
15-16	International Gas Union, council meeting, Paris, France.

Pull a Choke Instead of Your Tubing



Otis "Selective" Cross-Over Nipple Assembly with Removable Wire Line Chokes

FOR DUALLY-COMPLETED WELLS

- Select the operation you want and perform it without killing the well, pulling the tubing, or moving the packers
- Produce two horizons simultaneously — parallel or crossed-over — without commingling fluids
- Acidize, fracture, test, circulate, or plug either zone independently

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Canadian Dealer: Otis Pressure Control Export, Inc., Edmonton, Alberta

16 Permian Basin Geophysical Society, second annual meeting, Hotel Scharbauer, Midland, Tex.

19-22 The Institute of Gas Engineers, ninetieth annual meeting, London, England.

21-23 Panhandle Geological Society, field trip, Yucca Hotel, Raton, N. M.

24-27 American Gas Association, production and chemical conference, Hotel New Yorker, New York City.

25-28 Air Pollution Control Association, annual meeting, Lord Baltimore Hotel, Baltimore, Md.

25-29 American Society of Mechanical Engineers, annual conference and exhibit, oil and gas power division, Hotel Schroeder, Milwaukee.

27-29 Texas College of Arts and Industries, Kingsville, eighth annual short course in gas technology.

28-29 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Broadview Hotel, Wichita.

28-29 Natural Gas and Petroleum Association of Canada, London, Ont.

29-30 West Texas Geological Society spring field trip, Paisano Hotel, Marfa, Tex.

JUNE

2- 3 American Petroleum Institute, Division of Production, Pacific Coast District, Statler Hotel, Los Angeles.

4- 5 Kentucky Oil and Gas Association, annual meeting, Lafayette Hotel, Lexington, Ky.

7-12 Society of Automotive Engineers, summer meeting, The Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

14-18 Canadian Gas Association, Windsor Hotel, Montreal, Canada.

15-19 American Institute of Electrical Engineers, summer general meeting, Chalfonte-Haddon Hall, Atlantic City.

15-19 American Association for the Advancement of Science, petroleum conference, Colby Junior College, New London, N. H.

15-19 American Petroleum Institute, Division of Production, midyear committee conference, Hotel William Penn, Pittsburgh.

16-19 American Welding Society, national spring technical meeting, Shamrock Hotel, Houston.

JUNE 16-JULY 2 Intensive Course and Research Conference on Phase Behavior of the Hydrocarbons, University of Michigan, College of Engineering, Ann Arbor.

18-19 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Conrad Hilton Hotel, Chicago.

18-19 Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.

24-27 Intermountain Association of Petroleum Geologists, fourth annual field conference, Ogden, Utah, to Jackson, Wyo.

June 28-July 2 Petroleum Equipment Suppliers Association, annual meeting, Broadmoor Hotel, Colorado Springs, Colo.

JUNE 29-JULY 3 American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

JULY

July 30-Aug. 1 Wyoming Geological Association, eighth annual field conference, University of Wyoming, Laramie.

AUG.

17-19 Society of Automotive Engineers, international West Coast meeting, Georgia Hotel, Vancouver, B. C., Canada.

18-21 American Institute of Electrical Engineers, Vancouver Hotel, Vancouver, B. C.

24-26 Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, Va.

SEPT.

6-11 American Chemical Society, national meeting, Conrad Hilton Hotel, Chicago.

9-11 Pacific Coast Gas Association, San Francisco.

11-12 Association of Desk and Derrick Clubs of North America, annual meeting, Cosmopolitan Hotel, Denver.

13-16 American Institute of Chemical Engineers, Fairmont and Mark Hopkins Hotels, San Francisco.

15-16 American Petroleum Institute, executive committee, Greenbrier Hotel, White Sulphur Springs, W. Va.

16-18 National Petroleum Association, annual meeting, Hotel Traymore, Atlantic City, N. J.

21-25 Instrument Society of America, national instrument conference and exhibit, Sherman and Morrison hotels, Chicago.

24-25 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper.

27-30 American Society of Mechanical Engineers, annual conference, petroleum division, Rice Hotel, Houston.

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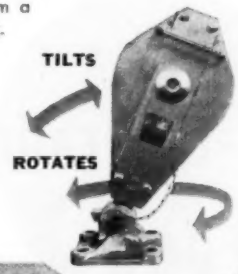

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JOURNALLY Speaking

Reptile Hazard

RICHFIELD OIL CORP., it seems, is having a lot of trouble with snakes in the San Joaquin Valley—the reptile variety, that is. Last summer the company hired a snake expert from the University of California to try to do a St. Patrick act and chase the snakes away from its drilling rigs and exploration crews, or, that failing, to teach the men how to avoid or to cope with slithering rattlers, which abound in desolate regions.

Apparently this professor didn't have the right combination, for now we see by the papers that Richfield has made a grant of $15,000 to the University of California for basic research into the habits and life cycle of rattlesnakes with the objective of discovering a key to the complete eradication of the species.

Richfield's medical director was quoted as saying that even hearty roustabouts show a marked reluctance to work around a well if they think rattlesnakes are near. This just goes to show how far a progressive oil company will go to protect the welfare, working conditions, and peace of mind of its employes.

It also goes to show how soft and sissified modern drilling crews are. We thought that roughnecks kept rattlers for pets and tool pushers ate 'em for breakfast. Shucks, when we were a boy in the San Joaquin Valley we thought nothing at all of seeing several rattlers every day as we hiked across the plains to school. And we didn't carry a flask of snake-bite remedy on our hip, either. And for a lot less than $15,000 we can tell Richfield how to get rid of the rattlers: Just kill off all the lizards and ground squirrels, and the snakes will starve to death.

Scraping Bottom

SOMEWHERE among the palm-fringed Antilles or on the blue waters of the Gulf of Mexico a three-master schooner is cruising leisurely and apparently aimlessly. But the results of the cruise (it says in the press release) may settle an argument of long standing among geologists.

For this schooner is filled with Columbia University scientists and fitted with all manner of the latest instruments of oceanography, from stroboscopic underwater cameras to Carbon-14 counters for radioactively measuring the age of the sea bottom.

"Is the Gulf of Mexico a huge stretch of the North American continent which millions of years ago became inundated by the ocean, or has it always been covered by water?" asks the university's press release. "The Columbia scientists hope, by studying core samples of sediment as much as 60 ft. thick, to find out. The earth's crust under the oceans is distinctly different from the crust on dry land and such an examination is expected to tell whether the bottom of the Gulf of Mexico was ever above water."

The findings of this expedition may or may not satisfy the geologists, but it should provide a new line of argument for the debate raging in Washington over whether the so-called tidelands belong to the states or the federal Government. In an attempt to prove that one side or the other has the rightful claim to oil royalties such-and-such a distance offshore, the embattled Senators have been hashing over arguments ranging from old Spanish customs to international fisheries conventions. But if there were scientific evidence that the gulf's floor was once part of Texas or always underlay the Spanish Main, a whole new set of speeches could be written. The case might even get sent back to the Supreme Court.

The bottom-probing schooner won't sight the Statue of Liberty again until midsummer, but at the rate that the tidelands debate is progressing, that should be in plenty of time.

Wind Beaters

WE note with some amusement that the Federal Power Commission is questioning the wisdom of a proposal by a natural-gas company to purchase a helicopter for pipe-line patrol. The bureaucrats apparently are suspicious of the industry's technological advances in using wind beaters so radically different from the type which predominates in Washington.

Henry D. Ralph

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Some glimmers of good news for gas

KEEP your fingers crossed, but the Federal Power Commission may be entering a new era of relationship with the oil and gas industry, an era of more appreciation of the problems of producers and of less effort to regulate production and gathering.

A new commissioner takes his seat this week, replacing one of the old members who was most adamant in demanding detailed regulation of gas from the well bore to the consumer under narrow rules of public-utility control. It is true that the new man has no background in petroleum, but he may be presumed to represent the philosophy of less federal control to which the current Washington administration is pledged.

LAST week the FPC took two actions which may indicate that a new attitude is dominant among the other four commissioners. After only 10 days of hearings, the FPC was prepared to authorize construction of a new pipe line to take gas from Spraberry field of West Texas, the waste of which caused that field to be shut in by state conservation authorities.

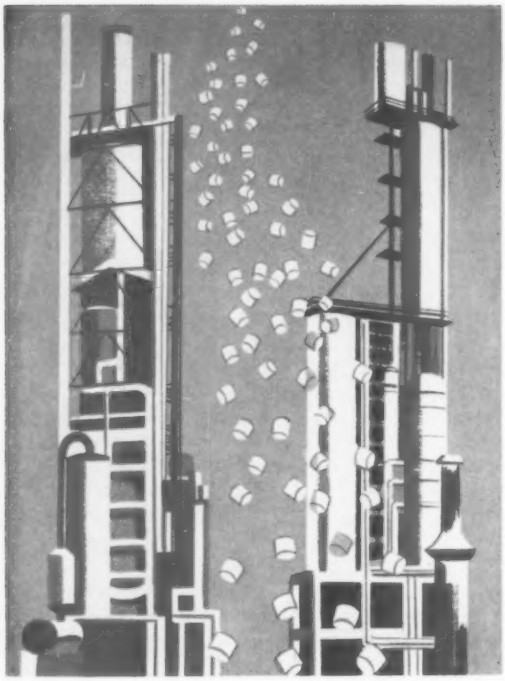
Of course, this application had been pending for a long time before the FPC got around to the hearing, and it is also true that the hearing on an application for another line from that area won't be held until June, but this is just about the fastest action in FPC's history and it suggests that the commission can be prodded into a realization of the need for flexibility where conservation and production are concerned.

ALSO last week the FPC dropped its charges that Northern Natural Gas Co. was "alienating" its gas supply by turning over its reserves and producing activities to a subsidiary. On the face of it this looks like a reversal of the former policy of trying to achieve regulation of gas production by imposing conditions on pipe-line authorizations.

Presumably this opens the way for all interstate companies to escape regulation of their producing activities by the simple procedure of setting up a producing subsidiary. And, presumably, this indicates that FPC may be abandoning its campaign to regulate field prices of any gas sold to interstate pipe lines.

ALL these things may be too good to be true, but they certainly are encouraging signs. They may indicate the dawn of a philosophy that oil and gas production can't be regulated like a street-railway system.

If a reoriented FPC disclaims all intention of regulating gas production and gathering, cooperates with state authorities on conservation, leaves field prices to natural market forces, and takes a realistic view of the problems of the entire gas industry, there will be a big increase in gas production and in its availability to all consumers.



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ACTIVITY BY CAT A	40	36
CPF	1.0	1.0
PELLET DIAMETER	0.19"	0.19"
MESH 3-6 MESH	99%	98.5%
HARDNESS	70	93 MIN.

TYPICAL YIELDS OF SR AS COMPARED TO REGULAR FILTROL TCC ARE:

GRADE	FILTROL TCC (23)	FILTROL SR (63)
CYCLE OIL, VOL. %	48	48
DEBUT. GASO., VOL. %	42	40.5
DRY GAS, WT. %	5.0	5.8
TOTAL C_4, VOL. %	12	13.5
COKE, WT. %	4.8	3.9
OCT. NO. F-1 CLR.	90	92.5

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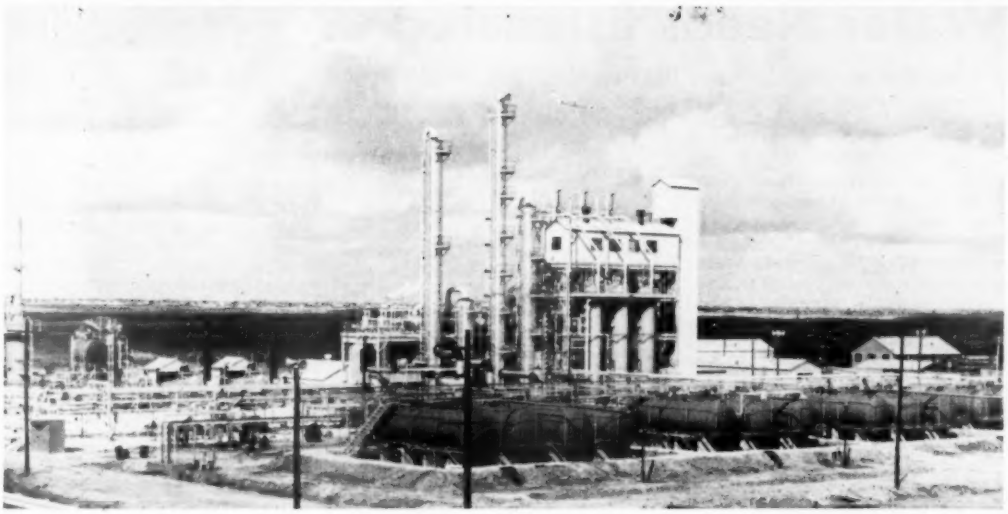
CATALYSTS AND ADSORBENTS

THIS WEEK



NEWEST PETROCHEM PLANT on the Gulf Coast is this ethylbenzene layout of Koppers Co., Inc., which was formally placed on stream last week at Port Arthur, Tex. The plant will combine ethylene and benzene to produce ethylbenzene, which will be used by the company's plant at Pittsburgh for the manufacture of polystyrene. Output is expected to be about 100,000,000 lb. per year.

GOVERNMENT.—Justice Department drops grand jury investigation of FTC oil-cartel charges but will proceed with civil suit. . . . ¶House passes appropriations bill cutting nearly a third from Truman's budget for Interior Department. . . . Synthetic-fuels program slashed. . . . Action followed committee recommendation that Government be kept out of activity which can be performed by private enterprise. . . . ¶Senate passage of Holland bill restoring tidelands to states expected this week. . . . ¶FPC approves Northern Natural's shift of its producing properties to a subsidiary in important decision in what may be turning point for federal agency. . . .

INTERNATIONAL.—Iran offers crude and products to all dollar buyers for half of current Persian Gulf price. . . . Offer good for 6 months, government says. . . . Suit by Anglo-Iranian pending in Italy, new one to be filed in Japan. . . . ¶American Independent starts confirmation well in Neutral Zone, plans to test Arab zone. . . . Discovery, which tested as high as 4,000 bbl. daily, to continue testing. . . . ¶Shell asks guarantees of Indonesian Government before increasing investment in area. . . .

SECONDARY RECOVERY.—Water needed to flood the 3 million stripper acres in the United States totals staggering 82 million barrels, Earlougher and Heath, Tulsa waterflood engineers, tell attendees at Sixth Oil Recovery Conference at Texas A. & M. College. . . . One and one-half million acres expected to be flooded within next 20 years. . . . ¶Dissension develops over water-injection method at hearing before Texas Railroad Commission on field rules for the world's biggest water-flood project, the SACROC Unit in Scurry County, Texas. . . . Plan for line-type pattern opposed by W. A. Moncrief interests. . . . ¶Snyder & Wood ask Railroad Commission to approve expansion of a 40-acre pilot flood in South Bosque field of McLennan County, Texas, to a full-scale flood of the 1,600-acre field. . . .

IMPORTS.—I.P.A.A. endorses plan to ask congressional action to restrict petroleum imports in any quarter to 10 per cent of domestic demand in the same quarter a year earlier. . . . Compact speakers agree imports rate is too high and damaging domestic industry, but as at I.P.A.A. meeting, they disagree over how reduction should be achieved. . . . Question is whether government intervention would be helpful in long run to industry. . . . State's Walter Bedell Smith warns that quota restrictions on imports would have tremendous effects on Venezuelan petroleum industry and could encourage nationalization. . .

NATURAL GAS.—State regulation of gas production and fixing of minimum prices recommended by Shamrock president. . . . This would eliminate price discrimination and encourage conservation, he says. . . . ¶Venezuela now using only 20 per cent of its gas but will boost figure to 50 per cent within 5 years, compact is told. . . . ¶Rising cost of gas is shrinking profits from natural-gasoline and cycling plants, N.G.A.A. told by Continental official. . . .

ACTIVITY.—Crude and lease-condensate production averaged 6,265,775 bbl. daily for week ended April 25, down 11,000 bbl. daily. . . . The total number of well completions for the week dropped 1 well to 937. . . . Wildcat completions totaled 190 compared with 199 for both previous week and same week last year. . . . Rotary rigs operating in United States decreased 14 rigs during the week ended April 27 to 2,531. . . .

TRENDS.—Primary stocks of the four major products decreased 4,958,000 bbl. in the 2-week period ended April 25 compared with an increase of 4,541,000 bbl. in the same weeks last year. . . . Compared with last year, the inventory position improved 9,500,000 bbl. in 2 weeks. . . . Greatest change was in residual fuel, down 1,629,000 bbl. this year and up 2,646,000 bbl. last year. . . .

Water Needs Estimated

Volume required to flood the roughly 3,000,000 stripper acres in the U. S. judged to be about 82 billion barrels

C. Malcolm Davis

COLLEGE STATION, Tex. — There are 3 million productive "stripper-well" acres in the United States. Of this total, 1.5 million acres may be water flooded within the next 20 years. How much water will be required?

The cumulative water requirements for this job would total a staggering 82 billion barrels, attendees were told at the Sixth Oil Recovery Conference held at Texas A. & M. College, April 22-23. The meeting was sponsored by the Texas Petroleum Research Committee.

Ten years hence, the Texas A. & M. audience was told, it is probable that the total injection rates for all water floods throughout the United States will be as much as 25 million barrels per day, of which at least 10 million barrels per day will be makeup water, with 15 million barrels per day being recycled water.

This estimate was prepared by R. C. Earlougher and W. A. Heath, consulting water-flood engineers of Tulsa, who said for the over-all spread of United States acreage it is probable that as much as 60 per cent of total water required will be makeup water, inasmuch as a large part of the acreage undoubtedly will be below average so far as flood performance is concerned. Thus, the estimated amount of makeup water required is 49 billion barrels.

Big Mid-Continent area . . . For the four Mid-Continent-Southwestern oil states of Kansas, Oklahoma, Texas, and Illinois, Earlougher and Heath indicated that 625,000 acres might eventually be flooded, out of a total stripper territory of 1,187,000 acres (see table). Ultimate water requirements for these four states would total 34.3 billion barrels, of which Texas would need 11 billion. Maximum daily water flood requirements for these four states would add up to 10.4 million barrels per day.

Where will the water come from? A good part, Earlougher and Heath believe, will be from subsurface formations. The Arbuckle limestone in Oklahoma and Kansas and its equivalent in Texas, the Ellenburger, constitutes an important source of supply water in the event shallower supply sands are absent.

Although the initial cost of developing water supply from the deeper formations is high, prolific supply usually can be procured with only a small fluid level draw-down from a high hydrostatic level.

Blanket subsurface sands, such as the Tar Springs in Illinois, the Douglas and Mississippian in Kansas, and the Elgin in Oklahoma, are used for water supply. Gravel beds underlying valleys of the existing rivers which are fed by the rivers also are used extensively.

Rate of supply required . . . This can be estimated on a sand volume method. The unit injection rate in a depleted or semidepleted field may run between 0.5 and 1.0 bbl. per day per acre-foot of total sand reservoir.

During the fill-up period, over-all economics favor a higher rate—1 to 2 bbl. per day per acre-foot. The advantage here is to obtain fill-up with a substantial increase in oil production in a period of 6 to 9 months.

The Tulsans said while some operators favor a much lower rate during the fill-up period, field results indicate that the higher rates can be used without impairing ultimate oil recovery and at the same time greatly improving the over-all economics. Settled injection rates of 1 bbl. per day per acre-foot can be maintained in many sand reservoirs occurring at depths below 1,000 ft. using surface injection pressures of 800 to 1,000 psi. and in nearly all cases maintaining an injection rate of 0.7 to 0.8 bbl. per day per acre-foot.

Earlougher and Heath reported that where water injection is used early in a field's life for pressure-maintenance operations, injection rates should be estimated at a minimum of twice the daily rate of oil production and preferably at a unit rate of between 0.5 and 1.0 bbl. per day per acre-foot of oil-sand reservoir.

Ultimate water requirements . . . Earlougher and Heath said case histories show a variation between 8 bbl. of water injected to 1 bbl. of oil produced at the economic limit of a water flood, to as high as 50 bbl. of water injected to 1 bbl. of oil produced. On a pore volume basis, the case histories indicate that cumulative water requirements on the pore volume method range between 150 and 170 per cent of total pore space.

Fractured formations . . . Potentiometric model studies of vertically fractured reservoirs show that every effort should be made to determine the nature and direction of fractures before initiating a water-flooding program, according to R. E. Collins, T.P.R.C. staff member. Collins presented a paper coauthored with Dr. P. B. Crawford, also of the T.P.R.C. staff.

This information will enable the operator to cut down channeling and bypassing and thus improve the sweep efficiency, Collins said.

In these model studies, fractures were originated at the well and extending into the reservoir for varying distances. Studies on line-drive patterns showed that the area sweep efficiency for a typical unfractured system is 70.6 per cent, he said.

If vertical fractures in a fractured system are parallel to the direction of flow, the areal sweep efficiency is reduced. The reduction depends on the length of the fracture. In one case, the sweep efficiency was found to be 44.6 per cent, he said.

Future Requirements for Flooding—Kans., Okla., Tex., Ill.

	Prod. stripper acres*	Prob. flood acres	Ultimate water requirements. Billions of bbl.			Max. daily requirements. Millions of bbl.	
			Total	Make-up	Recycled	Total	Make-up
Kansas	288,000	100,000	5.5	3.3	2.2	1.7	1.1
Oklahoma	260,000	175,000	9.6	5.8	3.8	2.9	1.9
Texas	416,000	200,000	11.0	6.6	4.4	3.3	2.2
Illinois	223,000	150,000	8.2	4.9	3.3	2.5	1.6
Total	1,187,000	625,000	34.3	20.6	13.7	10.4	6.8

*From 1949-50 National Stripper Well Survey, Interstate Oil Compact Commission.

On the other hand, if the fracture is at right angles to the direction of flow, the areal sweep efficiency is increased over that of an unfractured system. In one case the sweep efficiency increased to 84 per cent, Collins said.

Core analysis . . . Laboratory investigations indicate that actual reservoir oil saturations can be predicted from final oil and gas saturations at atmospheric pressure, C. E. Van Meter, Magnolia Petroleum Co., said in a paper coauthored with Dr. H. T. Kennedy, department of petroleum engineering, Texas A. & M., and R. G. Jones, Ohio Oil Co.

This method is currently in use in field operations.

During rotary coring operations using water-base mud, a volume of mud filtrate is flushed through the core which is proportional to the A.P.I. filtrate of the mud. Final oil saturation reaches a substantially constant residual value before one pore volume of total fluid is displaced from the core, Van Meter said. In most cases, he said, the oil flushing is complete when one-half pore volume of total fluid has been flushed.

For any core there is a certain relation between the initial oil saturation and the oil saturation after mud flushing. For example, studies show that at an original oil saturation of 50 per cent of pore space, the residual oil saturation after mud flushing of a typical limestone core is 43 per cent.

Oil saturations from Wall Creek and Woodbine sandstone cores decrease from original values of 50 per cent to 30 per cent and 25 per cent, respectively, after mud flushing. Relationships found in the investigations are useful for correlating initial and final oil saturations when there is no gas dissolved in either oil or water, Van Meter said. When cores are raised to the surface of a well, oil and water are displaced by evolved gas because of declining pressure. However, the oil and gas saturations at atmospheric pressure are related to the oil saturation in the reservoir before the core is flushed with mud filtrate, he said.

A correlation obtained chiefly on limestone cores enables the determination of in-place oil saturations of these and similar cores from laboratory data. Data from this correlation show that for a final oil-plus-gas saturation of 60 per cent, the initial oil saturation is 67 per cent.

Using oil-base mud, the water saturation of cores was unchanged by the flushing. However, small losses of water occurred during depressuring. These studies showed zero filtrate on the A.P.I. test.

Spraberry Appeal Set

Commission to contest permanent injunction permitting nonflaring operators in big field to continue production

AUSTIN.—The Texas Railroad Commission revealed last week that it will go directly to the Texas Supreme Court in its fight to close in production in sprawling Spraberry field of West Texas for excessive gas flaring.

The announcement followed on the heels of a District Court decision by Judge Charles O. Betts making permanent a previous temporary injunction permitting operators in the trend not now flaring gas to continue production.

The commission termed the ruling a blow at the entire shutdown order, contending that, if allowed to stand, it would in effect give operators who are allowed to produce permission to drain properties of those who are not.

The case will be taken directly to the state Supreme Court, according to C. K. Richards, assistant state attorney general, under a law which permits such action in cases involving the validity of orders by state regulatory agencies.

The decision . . . Judge Betts said the commission unquestionably has the power to prevent waste of oil and gas, however, that the decision must hinge on how the order operates on the individual producer.

There is no evidence before the court, he said, that the plaintiffs (Rowan Oil Co., Arthur Harvey et al, Plymouth Oil Co., Republic Natural Gas Co., and Blackwood & Nichols Co.) are wasting gas under the statutes.

Operations in the field, he continued, are not unitized and may not be unitized by the commission or any other authority. The operators cannot be treated as a unit under any order, he said, because they are not a unit.

On the other hand, Betts said he was bound by past Supreme Court decisions to uphold the shutdown order as a whole because the finding that 220,000,000 cu. ft. of casing-head gas was being flared daily in the Spraberry was "substantial evidence that waste is occurring."

Testimony . . . Positions of plaintiffs and intervening operators varied widely as to how the court should rule.

Attorneys for the plaintiffs contended that the order should be declared invalid, since it could result in the "ridiculous" situation of flaring operators holding up nonflaring operators for years by refusing to do anything to prevent flaring. In the event the order is not declared invalid, they said, then it should be modified to allow nonflaring operators to continue production, since field-wide shutdown would mean penalizing "the lawful operator because of the unlawful operator."

Other companies contended just as strongly that it would be even more inequitable to permit nonflaring operators to drain oil from the properties of those who would remain shut in under an injunction.

J. W. Stayton, attorney for Phillips Petroleum Co., maintained the test of the order was that it must be fair and reasonable under the circumstances. The loss to the operators which would be incurred under the order, he said, would far outweigh the value of the gas being flared. He argued that the order was indivisible—that it is valid in whole or invalid altogether. If the court should decide the order was invalid in part, he added, it could only strike it down in its entirety and send it back to the commission for whatever action the latter should wish to take.

West Coast pinch . . . Paul Kayser, president of El Paso Natural Gas Co., told the court that shutting down Spraberry field would cause a shortage of fuel affecting 1,500,000 users on the West Coast.

Kayser said El Paso delivers 60,000,000 cu. ft. of Spraberry gas daily to the California area.

Action anticipated . . . Meanwhile, in Washington, the Federal Power Commission was expected momentarily to approve construction by Permian Basin Pipeline Co. of a new big-inch outlet for Spraberry gas.

Final arguments were held and the hearing concluded April 28. The 164-mile, 16-in. to 30-in. line would pick up gas in Spraberry and deliver it to El Paso in Yoakum County, Texas. El Paso would turn it back in Moore County for delivery by Permian to Northern Natural Gas Co. at Dumas, Tex.

Water-Flood Approval Asked

AUSTIN.—Expansion of a 40-acre pilot water flood in South Bosque field of McLennan County to a full-scale flood in the 1,600 acre field is planned by Snider & Wood.

The operators have asked the Texas Railroad Commission to approve a unit-

ization agreement under which the field would be flooded. Homer Key, consultant for Snider & Wood, told the commission the plan calls for injection on a 40-acre five-spot pattern.

The field, discovered in 1902, produces from the Lower Walnut sand at a depth of about 470 ft.

SACROC Objection

Unit outlines proposed field rules for big water flood before commission; Moncrief says plan would "destroy us"

AUSTIN. — Proposed field rules for conducting secondary-recovery operations in the world's biggest waterflood project, in Scurry County, West Texas, were opposed here last week by the W. A. Moncrief interests in a hearing before the Texas Railroad Commission.

Opposition centered against plans of the Scurry Area Canyon Reef Operators Committee for a line-type water-injection plan, as opposed to a five-spot pattern, and against a proposal for a bonus allowable based on the amount of water injected.

Involved in the hearing was the SACROC Unit, encompassing nearly 50,000 productive acres in Kelly-Snyder field of Scurry County. The unit was approved by the commission in February and became effective March 1, but actual water-injection operations have awaited approval of field rules by the commission.

Moncrief objects . . . Rules proposed by SACROC representatives would, in addition to the line-type injection pattern, provide for transfer of allowables to other producing wells in the case of input wells or wells producing more than 10 per cent water or at a ratio exceeding 1,000:1. They also provided for a gas-oil ratio limit of 1,000:1, with credit for gas returned to the producing formation.

Gillis Johnston, Moncrief attorney, told the commission the SACROC plan would "destroy us." Moncrief's wells are on the eastern edge of the field.

Testimony presented by SACROC at the hearing showed that the field contains 1,238 wells, of which 960 are flowing, 272 are pumping, and 6 are off production.

SACROC testimony . . . R. F. Bryant, Jr., chairman of the SACROC land committee, said the unit area covered 48,760 acres. He said that 178 of the 319 tracts have signed the agreement 100 per cent. Another 97 tracts have qualified, he said, and in these all but 0.12 per cent of the working interests and 3.23 per cent of the royalty interests have signed. Only 44 tracts within the units outer limits have not qualified, he said, and these involve 4,969 acres or 8.09 per cent of the total unit. In these tracts, he said, 4.69 per cent of the working interest and 4.26 per cent of the royalty interests are unsigned.

Martin G. Miller, SACROC consulting engineer, told the commission the reservoir has passed the oil-expansion energy stage and that production is now under expanding dissolved gas. The quantity of unrecoverable oil by primary means was calculated at 2,162,000,000 bbl. Miller said it is estimated that the proposed water flood would recover 795,000,000 bbl. more than primary recovery.

Regarding the line-type injection plan, Miller said the five-spot pattern was considered less efficient. Under it, he said, the operators would have to convert about half of the existing wells to injection. It would also require more water, although, he added, it would result in a more even maintenance of pressure.

GULF COAST

Plant on Stream

Koppers dedicates new ethylbenzene facilities

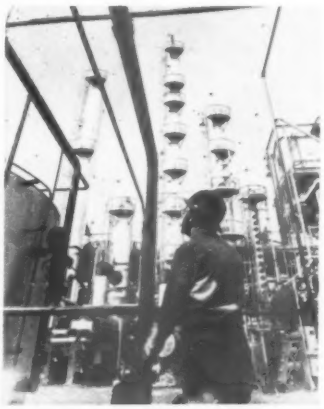
PORT ARTHUR, Tex. — The Williams ethylbenzene plant of Koppers Co., Inc. — the newest petrochemical plant on the Gulf Coast—was formally placed "on stream" here last week following dedication ceremonies.

The plant was designed to produce approximately 90,000,000 lb. of the intermediate chemical which will be used by Koppers to synthesize styrene and polystyrene in expanded facilities at its Kobuta plant at Pittsburgh. Early operations indicate, however, that the plant will exceed design capacity and will be capable of producing at 115 per cent of rated capacity.

Ethylene feed stock for the plant is obtained from the recently completed ethylene plant of Gulf Oil Corp. and is combined with benzene by the normal Friedel-Crafts reaction to produce ethylbenzene, the end-product of the Port Arthur plant. This is subsequently dehydrogenated to styrene (vinyl benzene) which in turn is polymerized to the polystyrene at the Kobuta plant.

Novel movement . . . An interesting transportation arrangement has the benzene requirements of the plant collected from eastern and southern coke plants and shipped down the Mississippi River and over to Port Arthur by barge. The same barges are then used to return ethylbenzene to the Kobuta plant.

Construction of the facilities was by Koppers. The firm operated the huge Kobuta styrene-butadiene plant for the Government during World War II. With purchase of the styrene facilities at the end of the war, Koppers' became a major producer of styrene.



DISTILLATION COLUMNS, insulated with aluminum, at the new Williams plant of the chemical division of Koppers Co., Inc., at Port Arthur.

Styrene has been used widely in the preparation of GR-S-type synthetic rubber, wherein it is copolymerized with butadiene. Polystyrenes are used to make instrument panels, high-frequency insulation, chemical and cosmetic containers, and battery cases.

Gas Properties Sold

HOUSTON.—Texas Eastern Production Corp. is purchasing the producing property of Meredith, Clegg & Hunt et al in West Hampshire field, Jefferson County, Texas, for $9,600,000, according to an announcement by H. A. Hemphill, president. Hemphill stated that the present production of these properties is approximately 20,000,000 cu. ft. of gas per day and that the takeover of the properties is to be effective as of March 1, 1953.

FIELD MATERIALS COMMITTEE of the I.P.A.A. in session in St. Louis. Left to right are James V. Boxell, Calvert Drilling, Inc., Olney, Ill.; Lyle Cummins, independent, Lafayette, La.; H. R. Hansen, Lawton Oil Corp., Magnolia, Ark.; Emmett Vaughey, Vaughey & Vaughey, now with the Petroleum Administration for Defense, Washington; W. T. Blackburn, Vaughey & Vaughey, Denver, committee chairman; W. G. Warnock, Mid-Continent Petroleum Corp., Tulsa, vice chairman; Bob Korte, I.P.A.A., Tulsa, secretary; S. O. Beren, Mountain Iron & Supply Co., Wichita; and George P. Ellison, Producers Pipe Line Co., Inc., Owensboro, Ky.

Imports Limit Endorsed

I.P.A.A. affirms resolution calling upon Congress to set up quota system restricting shipments of crude, products

Ted A. Armstrong

ST. LOUIS.—The Independent Petroleum Association of America again went on record last week in favor of congressional action to limit imports of crude oil and products.

By an almost unanimous voice vote, members attending the I.P.A.A. mid-year meeting here April 27-28 affirmed a resolution written by the association's imports-policy committee in San Antonio March 16. This resolution called for a quota system set up on a quarterly basis which would restrict imports to a maximum of 10 per cent of total domestic demand in the same quarter of the previous year.

The I.P.A.A. action followed an announcement by Maston Nixon, president of Southern Minerals Corp., Corpus Christi, that he was resigning as chairman of the imports-policy committee. Declaring himself opposed to "going to Congress for a law," Nixon said he would not be able to offer "the leadership you will need" to make the program successful.

"I strongly believe that this is a problem that should be settled by the individual companies of the oil industry," Nixon told the meeting. "How can we expect less government in business if we run to Congress with our problems," he asked.

Situation "serious"—However, he said, he agreed with the committee that imports are too high, except for California, "and feel that the domestic industry is being seriously impaired in building up additional reserves and capacity to produce, so imperative to our national defense program."

He told the association the proposed 10 per cent quota "is a good figure" and said his opposition to the I.P.A.A. program was strictly "one of procedure."

The resolution adopted by the association declared that nothing has occurred to "lessen the seriousness of the import situation." "A voluntary solution of the problem through industrial statesmanship has not been forthcoming. In fact, principal importing companies continue to deny that any problem exists," the resolution said.

Materials outlook . . . A definite shortage of casing and tubing during the remainder of this year can be expected, the association was told by its field materials committee. Unbalanced inventories also may mean spot shortages of drill pipe in the third quarter, the committee's report said.

Shortages are not expected in any other oil-field materials and equipment with the possible exception of seamless line pipe in the smaller sizes, the association was told.

The producers were warned to "assure themselves of a source of supply for their projected requirements rather than assume these materials will be readily available."

Rising costs described . . . Increased

PRINCIPAL FIGURES at the I.P.A.A. meeting included these three. Left to right are B. A. Hardy, Shreveport independent and former president of the association; and Paul Kayser, president of El Paso Natural Gas Co., Corpus Christi, and J. H. Dunn, president of Shamrock Oil & Gas Corp., Amarillo, both program speakers.

IN CONFERENCE at the I.P.A.A. meeting are H. H. Hinson, Continental Oil Co., Houston, and Maston Nixon, president of Southern Minerals Corp., Corpus Christi.

costs in all phases of the petroleum industry have cut company earnings, the association was told by its cost-study committee.

In 1952, the committee said, these factors drove up the cost involved in finding the producing oil:

Cost of materials, equipment, and labor continued to rise.

... The average well was more than 200 ft. deeper than in 1951 and 650 ft. deeper than in 1947, and the percentage of dry holes to the total wells drilled was the highest on record.

... Leases became more expensive.

... Greater outlays were required for geological and geophysical operations, and the number of crews climbed 46 per cent over the 1947-49 period.

Compared with the 1947-49 period, the committee said, hourly wages last year were up 27.2 per cent, the number of employes was up 6.4 per cent, construction costs were up 26.3 per cent, cost of steel was up 25.5 per cent.

These increases, the committee reported, are serious in view of the fact there has been no general increase in crude-oil prices since 1947, although "the prices of all other commodities has risen sharply."

Manabi Involved in Suit

HOUSTON.—Canada Southern Oils, Ltd., has filed suit for damages of $1,450,000 or return of 226,950 shares of Manabi Exploration Co., Inc., stock in federal court here.

Defendants are Cecil V. Hagen, Manabi president, and former Canada Southern president, W. A. Pruett, Robert G. Vehrman, Jr., I. B. Herring, Crockett & Co., and Roy B. Kelly.

The Canada Southern suit alleges that actions of Hagen and others resulted in removing Manabi from Canada Southern's control.

Gas Price Fixing Urged

State regulation, pricing "isn't so ugly after all," Dunn of Shamrock tells I.P.A.A.; Kayser says higher price needed

ST. LOUIS.—State regulation of natural-gas production and pricing was endorsed before the midyear meeting of the Independent Petroleum Association of America here last week by J. H. Dunn, president of Shamrock Oil & Gas Corp., Amarillo, Tex.

"As long as we have great quantities of gas being produced and large reserves . . . and we have discrimination in prices being paid to producers and royalty owners, a good case can be made for regulation and control of price at the source of production," Dunn declared.

If price fixing by the state isn't the answer to the problem, he declared, "then the purchaser should find a better answer at the earliest possible time."

Dunn cited Texas' market-demand proration statute, its restrictions on gas-oil ratios, and other controls as evidence that "regulation" is not necessarily bad, and asserted that fixed gas prices in Kansas and Oklahoma portions of Hugoton field have shown that "price fixing isn't so ugly after all."

Some pipe-line purchasers, he said, "have found a way to make their prices uniform and nondiscriminatory," but said "it is expecting too much for business statesmanship alone to solve these problems."

"The only answer can come from regulation properly supported by economics," he declared. Dunn also suggested that with the development of underground-storage reservoirs it may eventually be possible to institute statewide gas-producing allowables and to eliminate selective purchasing of gas, as has been done in Texas with oil.

Price-hike plea . . . Paul Kayser, president of El Paso Natural Gas Co., told the association that oil producers and gas transporters alike should seek to raise the low level of field prices for natural gas.

"The vast majority of all gas marketed is produced by the oil industry," and the oil producers, therefore constitute an essential segment of natural-gas industry, Kayser said. The oil industry depends on the gas industry to market the gas, and the gas industry, in return, is dependent upon the oil industry to discover the gas, he declared.

Gas industry has responsibility . . . "The responsibility rests on the gas industry, particularly the pipe-line companies and the distributing companies, to do everything in their power to see to it that the price paid for gas in the field is sufficient to stimulate and sustain exploration and discovery," Kayser said. "But likewise," he continued, "the obligation rests on the oil industry, as the principal producer of gas, to see to it that exorbitant prices are not charged and that particular situations are not taken advantage of to raise the price beyond reasonable bounds."

The most dangerous thing the oil industry could do, he added, would be "to press the rise of the field price too rapidly." The gas industry already is controlled by government except in production, and drastic price changes would result in a public demand for its regulation, he said.

Procedure Disputed

I.O.C.C. speakers agree that imports are too high but split on advisability of asking Congress to set limit

Henry D. Ralph

NEW ORLEANS.—Excessive imports are a threat to the conservation of oil in the United States, it was agreed by two speakers at the spring meeting of the Interstate Oil Compact Commission here April 24-25, but they differed on what should be done about it.

Chairman Ernest O. Thompson of the Texas Railroad Commission took the view that the present rate of imports is only temporary and will be reduced through voluntary action on the part of importing companies.

But Russell B. Brown, general counsel of the Independent Petroleum Association of America, declared that only limitations set by Congress can solve the problem permanently and satisfactorily.

Thompson pointed out that the increase in demand this year is 5 per cent over last year, but crude imports have increased 45 per cent and prod-

ucts 11 per cent and that the increase of 400,000 bbl. per day in imports is the same amount that Texas has cut production over the past few months. He declared:

"A staggering blow has been struck at the nonimporting oil producers. Fewer wells are being drilled. That will mean less oil will be found unless the importers taper down to supplementing rather than supplanting domestic oil.

"Let's not quibble about words. The facts are real. We are up to our necks in oil. We cut, and the importers take the field. It is not fair dealing. Unless the trend is reversed, we shall face a dwindling domestic oil supply for national security."

The real threat . . . Thompson said there need be little worry about imports from South America or Canada because the costs of that oil are competitive and those countries can be counted on to cooperate in balancing supply and demand. The real threat, he said, is Middle East oil, and he declared that this production should develop its own markets in Europe and Asia.

In spite of this, Thompson repeatedly said that the present situation is only a temporary plight of oversupply. He cited the recent announcements of several large importing companies that they are reducing their importing schedules during the next few months, and expressed the belief that the tide has turned and that further voluntary reductions in imports soon will solve the problem.

Brown dissents . . . Russell Brown disagreed. Only Congress can regulate foreign trade, he declared, so there must be a federal law to keep the total supply of oil in line with market demand just as the various state regulatory bodies which make up the Compact Commission prevent overproduction as a conservation measure.

"All have hoped," he said, "that this problem could be solved by those importing oil. I long entertained such hope. As much as I would like to retain this faith, I cannot and do not now. There may have been a time when they could have solved this entire problem through their own acts. I do not believe that is now possible. We all remember East Texas. If voluntary controls had been practical, we would not have needed state conservation laws."

Two representatives of foreign countries, present as official observers of the Compact Commission, supported Thompson's view that statutory restrictions on imports are not necessary. They were Carlos Perez de la Cova, minister counselor for petroleum affairs of the Venezuelan Embassy in Washington, and I. N. McKinnon, chairman of the Alberta Petroleum and Natural Gas Conservation Board. In diplomatic language, both of them pointed to the mutual cooperation of their countries with the United States in matters of conservation and expressed the belief that the problem of imports will be solved in the same manner.

Price and conservation . . . The delicate subject of price and its relationship to conservation was broached by Gov. Edward F. Arn of Kansas, chairman of the Compact Commission, in his address of welcome to the 12 oil-state governors present.

"It seems to me," he said, "that a new concept of conservation is slowly but surely emerging. That is to say that an increasing number of serious-minded individuals, in my opinion, are beginning to realize that an adequate price is a most important factor in conservation.

"With fair and adequate regulations with respect to production practice and price, wasteful use will be greatly reduced or eliminated, and greater inducement for the development of additional reserves will be provided.

"Surely and certainly this will inure to the benefit of consumers however far they may be removed from producing areas, in that greater supplies will thus be available to them over a longer period of years. The consuming public can ill afford the luxury of natural-gas pipe lines operating at less than capacity. I firmly believe that the national welfare requires this approach in aid of conservation."

Public-lands issue . . . A controversy over ownership of the public domain marked the meeting of the commission's public-lands committee. A majority of the committee approved a resolution endorsing legislation now pending in Congress to transfer to the various states the mineral rights in federal public lands. It was strongly supported by members from public-land states on the ground that if Congress is to return offshore oil rights to coastal states it should do the same for inland states.

A minority of the committee, led by members from Oklahoma, opposed the resolution on the ground that it is political and outside the scope of the Compact Commission. The committee's resolution was presented to the commission's executive committee where it was passed over without action, several members arguing that the subject is so controversial that it should have further study.

Better Fractures

Improved techniques result in big increases in oil yield of majority of wells treated, Interstate Oil Compact told

NEW ORLEANS. — Rapid improvements in the technique of fracturing producing formations have brought large increases in the yield of the majority of wells treated, and experiments now under way promise still more startling developments in oil recovery, the Interstate Oil Compact Commission was told at its spring meeting.

A review of the progress and a forecast of things to come from hydraulic fracturing was presented by George C. Howard of the research department of Stanolind Oil & Gas Co., Tulsa, and William D. Owsley, vice president of Halliburton Oil Well Cementing Co., Duncan, Okla. These two companies first introduced the method to the industry 4 years ago, but several other companies are now offering similar services.

During the 4 years of commercial application of the process, they reported, more than 21,500 fracturing treatments have been performed on 18,000 wells, and 75 per cent of the wells have successfully responded to treatment and have shown an average 175 per cent increase in production.

It is now possible to apply fracturing to any type of formation and almost any well condition, to make multiple fractures in the same formation, and to refracture at a later date. Also, operators are now able to spot their fractures more accurately and to overcome obstacles which once were believed to make fracturing impractical.

New ideas . . . "Since the original concept of increasing the productivity of oil and gas wells by hydraulically fracturing the producing formation, there has been a continuous stream of new ideas," said Howard. "Some of these have become commercially available, while others are still in the laboratory stage of development.

"Noteworthy of the major effort that is being devoted at this time toward the improvement of the hydraulic frac-

turing process is the research program to develop improved fracturing fluids and procedures for forming large-diameter fractures.

"These fractures, of say 300 to 600-ft. radius, would permit effective drainage of the formation adjacent to the fractures. This type of fracture and the resulting drainage pattern is believed to be particularly advantageous in formations of low productivity. Preliminary field tests designed to obtain large-diameter fractures have indicated that this method of treatment shows definite promise.

"Considerable effort is also being directed toward the development of a method for accurately placing the fractures made by the hydraulic fracturing process at the desired depth in the well being treated.

"These and many other ideas are in various stages of development and indications are that the next few years will see major improvements in the hydraulic fracturing process as we know it today."

Conservation value stressed . . . Both speakers stressed the value to conservation and increased ultimate recovery of oil promised by the rapid growth in the technique and practice of fracturing, and declared the process to be of inestimable value in increasing the nation's production of oil and gas.

Two major questions on this point were answered by statistics cited by Howard:

1. Does fracturing result in a sustained production increase and, if so, does the extra production represent an increase in the proven oil reserves or is the same amount of oil merely recovered more rapidly?

Limited data available indicate that at the end of 6 months 75 per cent of the wells showed a sustained production increase, at the end of 2 years 60 per cent showed a sustained production increase, and at the end of 3 years 55 per cent had a production rate greater than before fracturing.

2. Does fracturing increase the recoverable crude reserves or does it merely permit the production of the original recoverable oil in a shorter period of time?

Wells of a certain type have only a limited period of increased production after fracturing, but often this represents oil that would not have been recovered before the well reached its economic life if it had not been fractured. On other types of wells the decline curve continues down at about the same rate after fracturing as before but at a higher level throughout the life of the well, showing a definite increase in the volume of yield.

Even though the decline curve may fall off rapidly soon after fracturing, the speakers declared, most operators are satisfied because the extra production for a period more than pays the cost of treatment and makes it economic to drill wells in certain formations or to continue to operate old wells for a longer period of time.

Improvements cited . . . Among the improvements and refinements in fracturing which have been successfully applied during the past 4 years, the two speakers listed the following:

. . . The use of thickened acid for fracturing lime formations of high solubility, usually without the need for sand as a propping agent nor the use of a separate gel breaker.

. . . Treating lime formations of low solubility with a low-penetrating liquid such as viscous fuel oil or thickened kerosine or crude oil, and following immediately with hydrochloric acid.

. . . Creating multiple fractures by plugging the first fracture with ground-up mothballs or naphthalene pellets which subsequently dissolve in the crude oil but which in the meantime permit additional treatments to create new fractures in other sections of the formation.

. . . Treatment of wells with exposed shale, once considered unsuited to the fracturing process.

. . . Successful use of the method in wells of very low bottom-hole pressure, formerly considered an uneconomic practice.

. . . Refracturing of wells which had been fractured at an earlier date.

. . . Use of much larger volumes of fracturing fluid and higher quantities of sand as a propping agent.

. . . Addition of various chemicals to the fracturing treatment, such as sulfonic acid to prevent emulsion formation and break loose interstitial water.

. . . Proper preparation of a well for fracturing, including correct isolation of the zone through sound cementing of the casing, localizing shots in a perforated zone, using the strongest possible packers and well-head equipment, use of the largest practical working string of tubing to increase the pressure at the face of the formation, and chemical treatment of the producing zone prior to fracturing.

Gas Program Outlined

Though handicapped by lack of adequate markets and other factors, Venezuela is fast reducing waste, Compact told

NEW ORLEANS.—Venezuela is now utilizing only 20 per cent of its production of natural gas, but projects under way will increase this to 50 per cent by 1958.

One major producer, having more than half of the nation's gas reserves, has made plans to utilize 80 per cent of its gas by 1956.

The chief use of natural gas in Venezuela at present is in repressuring oil fields, and the country is making rapid strides in reservoir engineering and control of production to increase ultimate recovery of oil, the Interstate Oil Compact Commission was told by two officials of the Venezuelan Government.

Dr. Eduardo A. Acosta H., of the conservation department of the Ministry of Mines and Hydrocarbons, Caracas, and Dr. Carlos Perez de la Cova, Minister Counselor for Petroleum Affairs of the Venezuelan Embassy, Washington, presented to the engineering committee at the Compact's spring meeting here a detailed report on their country's program for the conservation of oil and gas.

Market handicap . . . Gas utilization has been hampered by lack of adequate markets in Venezuela, but the industrial and residential demand is growing and in 1952 two large transmission lines were placed in operation, they reported. Venezuela's dry gas, not associated with oil production, amounts to only 4.24 per cent of its total gas reserves. There are only 73 gas wells in the country, and at present only 18 of them are producing, with all of the production utilized in transmission lines or for oil-field gas lift.

Gas-cap gas also presents few problems of conservation, because there are few fields of this nature in Venezuela and operators in these fields do not produce from gas-cap or high-gas-ratio wells.

Biggest problem . . . The biggest conservation problem in Venezuela is utilization of dissolved gas produced with crude oil, which constitutes 95.76 per cent of the nation's gas reserves, and the two speakers said that their government is making serious efforts to prevent the flaring of this casing-head gas, chiefly through projects to return it to the producing formation. Such projects have increased gas utilization from 13 per cent of that produced in 1951 to 20 per cent during the first 3 months of 1953.

As the result of cooperative studies of reservoir engineering conducted by the Ministry of Hydrocarbons and the principal producing companies, Venezuela now has 24 gas-injection and 3 water-flood projects in operation, with 7 more gas-injection projects to be placed in operation during 1953, they reported.

The government encourages pressure-maintenance projects by allowing favorable production rates and by shutting in wells with high gas-oil and water-oil ratios. For example, during December 1952, 387 wells were shut in because of high gas-oil ratios and 65 because of high water-oil ratios, and in January 1953, 372 high-gas and 71 high-water wells were shut in. Also in December 1952, the government ordered a gas-oil ratio of 850:1 for the L4 sand of Chimire field and reduced production from 22,000 bbl. per day to 15,000 bbl. per day to conserve reservoir energy.

Largest project . . . The largest gas-return project in Venezuela, and perhaps the largest in the world, is that now being constructed by Creole for the Eocene B-6 sand of the LL-370 reservoir in the Tia Juana district of Lake Maracaibo.

This reservoir has a productive area of 9,800 surface acres and lies under 62 ft. of water 2.4 to 7 miles off the lake shore. The project will cost $28,000,000, and next year will start injecting 130,000,000 cu. ft. of gas per day. It is estimated to increase ultimate recoverable oil from 24.6 per cent to 35 per cent, or an additional 229,000,000 bbl. of oil, and at the same time to save for future use one-fourth of the gas now being wasted in this area.

Opening Ceremony Set

Lyons to welcome visitors in address opening petroleum exposition May 14; cost of oil show set at $10,000,000

Ted Armstrong

TULSA. — Colorful ceremonies will officially open the thirtieth anniversary International Petroleum Exposition, one of the world's most fabulous industrial shows, here May 14.

An estimated 5,000 persons will be on the exposition grounds to hear the welcoming address of Charlton H. Lyons, Shreveport independent and president of the Independent Petroleum Association of America.

Lyons' address will follow the raising of a 40 by 60-ft. United States flag between two 140-ft. drilling masts. A parade of flags representing all oil-producing nations of the world will be escorted by five marching bands to the oil-show headquarters of the Nomads, where they fly during the 10-day exposition.

Brief introductory remarks at the opening will be made by W. G. Skelly, president of Skelly Oil Co. and the I.P.E., and Gov. Johnston Murray of Oklahoma, who has served as chief ambassador of the exposition in extending invitations to the oil show both in the United States and abroad.

Biggest show yet . . . A total of 1,484 exhibitors will be represented in 883 sheltered booths, 50 exhibitor-owned buildings, and in outdoor areas on the exposition 28-acre tract.

William B. Way, exposition manager, last week estimated the total cost for putting on the oil show will be "in the neighborhood of $10,000,000," with equipment on display valued at more than $100,000,000.

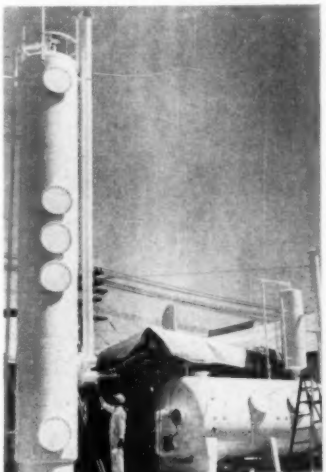
Plans for handling visitors are based on an estimate that 500,000 persons will visit the oil-show grounds, compared with 300,114 in 1948 and 194,491 in 1940. This would be in sharp contrast with attendance at the first exposition, in 1923, when only 14,203 entered the gates.

Activity increasing . . . For more than 2 months workers have been active on the site, repairing existing buildings and erecting new ones, extending utility facilities to two new areas added to the exposition grounds this year, and making preparations to receive exhibits for the show's grand opening.

Last week five rigs already had been erected, shot-hole rigs were drilling holes for demonstrating pumps and other field equipment, and bunting had been hung in all of the exposition buildings.

Several companies were putting finishing touches on their new buildings and preparing to move in the last of the equipment they will display at the show.

Housing . . . There was little question last week but that there would be plenty of housing to take care of all visiting oil men attending the exposition. Housing officials had such a surplus of rooms and entire houses listed that they had closed their records to new listings.



IN PLACE at the exposition grounds are these heater treaters, latest designs of Union Tank & Supply Co. The vertical and horizontal units, weighing 6,000 and 9,000 lb. respectively, arrived last week and were immediately set up and painted.

Aid for Oil Men

A central message clearing house will be operated at the International Petroleum Exposition again this year by The Oil and Gas Journal.

A special switchboard will be operated from 8 a.m. until 9 p.m. daily,

SNAZZY RIG is this layout of National Supply Co., covering its 10,000 sq. ft. of exhibit space at the I.P.E. Visitors will be able to mount the steps and ramp at right and find themselves in an air-conditioned "observation deck" overlooking the rig floor.

and messengers will be on hand to call persons to the telephone or to deliver messages.

To reach an associate or friend on the grounds, simply call one of these numbers:

6-2160

6-2167

6-2168

6-2169.

Reading Clinic

Journal to sponsor tests of aptitude during I.P.E.

TULSA.—The Oil and Gas Journal, at the forthcoming thirtieth-anniversary International Petroleum Exposition, Tulsa, May 14-23, will sponsor special "Improve Your Reading" tests.

The reading tests will be given to visiting oil men who wish to test their reading ability.

The special test will consist of 1,000 words, during which a reading rate will be established. Next, a comprehensive check on the text read will be made, and the two will provide anyone a good index on whether or not he needs to avail himself of the advanced reading courses now offered to business men throughout the country.

The testing will be handled by personnel of the University of Tulsa Reading Clinic. All of the individual test papers will be sent to the university for grading and the university in turn will mail the test grade to the one examined. The university and the Journal will tabulate only the average reading figures in the oil industry for management men, for technical personnel, and for field supervisors.

The tests will be given at the Journal building at the I.P.E. A short 3-minute movie also will be shown, from the Harvard Business School's reading course, to point out the opportunities for inspiring both speed and comprehension in business reading by following a few simple rules.

Also, in the Journal's reading clinic, four "reading accelerators" will be operated to show the four different rates of speed at which business men should be able to function. These are: Skimming, to locate information; Rapid, to get general impressions; Careful, to get details; Intensive, to analyze.

The University of Tulsa Reading Clinic, a division of the University of Tulsa, is a J. E. and L. E. Mabee foundation. Direction of the reading clinic will be by a staff from the University of Tulsa headed by Miss Loris De Figh.

Octanes Inch Upward

Du Pont reports average gain of 0.1 number in ratings of premium and regular motor gasoline during first quarter

OCTANE numbers of both premium and regular gasoline increased only 0.1 during the first quarter of this year, according to the latest survey by the petroleum-chemicals branch of E. I. du Pont de Nemours & Co., Inc.

The unweighted 47-city average for premium gasoline as of the first of April was 91.0 compared with 90.9 at the first of the year and 89.9 at the end of the first quarter last year.

The average for premium at the end of the first quarter was 1.6 octane numbers higher than for the corresponding survey in 1950. Regular gasoline moved up only 1.2 points in the same period to average 84.4 on the latest survey. Both premium and regular

Comparison of Motor-Gasoline Surveys

(Octane numbers are by research method, arithmetic averages by cities)

	Premium				Regular			
	Octane number			TEL cont. cc./gal.	Octane number			TEL cont. cc./gal.
	Apr. 1952	Jan. 1953	Apr. 1953	Apr. 1953	Apr. 1952	Jan. 1953	Apr. 1953	Apr. 1953
Aberdeen	89.0	90.0	89.7	2.11	81.5	83.3	83.6	1.56
Amarillo	88.8	89.4	89.5	2.21	81.4	81.5	81.8	2.46
Atlanta	91.8	92.5	92.5	2.14	84.6	85.3	85.4	2.59
Bakersfield	89.5	89.2	89.6	2.68	80.4	80.6	80.8	1.43
Baltimore	92.5	92.4	93.2	2.62	86.7	86.8	88.0	2.12
Boston	91.6	92.7	92.9	2.13	86.6	87.6	87.8	2.03
Calgary	86.1	86.6	86.9	2.64	80.0	81.3	81.5	2.35
Casper	88.3	89.0	89.6	1.48	81.9	82.2	81.8	1.25
Charlotte	91.7	92.5	92.4	2.32	85.0	85.3	85.5	2.31
Chicago	89.2	90.4	90.2	2.00	82.2	83.8	83.7	1.98
Cincinnati	90.7	92.2	92.1	2.39	86.0	86.6	87.0	2.20
Cleveland	90.6	92.8	92.4	2.63	86.4	87.4	87.3	1.84
Columbus	90.5	92.0	92.6	2.41	86.1	87.6	87.6	2.10
Corpus Christi	91.1	91.9	92.1	2.54	84.4	84.6	85.1	2.46
Dallas-Fort Worth	91.4	92.4	92.5	2.32	83.1	84.5	85.2	2.46
Denver	88.5	89.7	89.4	1.47	80.4	81.1	81.1	1.45
Detroit	90.5	92.3	92.5	2.54	85.9	87.0	86.8	1.81
Edmonton		87.1	87.8	1.20		82.5	82.3	0.77
El Paso	85.7	90.6	90.3	2.65	77.3	81.3	81.0	2.08
Great Falls-Billings	90.4	90.7	91.0	1.61	82.2	83.0	83.5	1.15
Houston	92.0	92.1	92.3	2.44	85.0	85.2	85.9	2.42
Indianapolis	89.9	90.0	90.4	2.40	83.0	84.0	84.6	2.09
Jacksonville	91.4	92.3	92.6	2.16	85.1	85.8	85.9	1.97
Kansas City	88.6	90.1	89.8	2.22	81.7	83.3	83.9	1.77
Little Rock	90.5	91.7	91.6	2.37	83.9	85.4	85.5	2.25
Los Angeles	89.7	90.8	90.7	1.92	81.7	82.8	82.2	1.61
Louisville	90.2	91.8	92.0	2.55	84.4	86.1	85.3	2.35
Memphis	90.9	91.6	91.2	2.68	83.3	85.4	85.2	2.07
Milwaukee	88.8	91.4	91.4	2.48	82.6	83.9	83.7	1.91
Minneapolis	88.8	89.9	89.9	2.27	82.2	83.4	83.4	1.88
Montreal	89.8	90.3	90.6	1.52	84.8	86.3	86.0	0.71
Nashville	90.4	91.8	91.6	2.46	83.9	85.2	85.9	2.07
New Orleans	91.2	91.6	91.5	2.59	84.1	85.7	85.6	2.12
New York (met. area)	92.0	92.2	92.4	2.34	86.7	87.0	87.3	2.03
Omaha	88.6	89.6	89.5	2.22	81.6	82.7	82.9	1.58
Philadelphia	91.5	92.3	92.8	2.28	86.3	87.1	87.7	2.12
Pittsburgh	91.5	92.1	92.5	2.23	86.4	87.3	87.3	2.17
St. Louis	88.7	90.1	90.2	2.03	82.2	83.9	83.5	1.77
Salt Lake City	89.2	87.9	88.6	1.05	79.6	79.7	80.6	0.95
San Francisco	90.3	91.4	91.3	2.22	81.4	82.4	82.2	1.31
Seattle	90.2	90.7	91.0	1.94	81.2	82.0	82.6	1.84
Shreveport	90.2	91.6	92.1	2.62	83.5	84.9	85.0	2.18
Spokane	90.0	90.1	90.7	1.63	81.8	82.9	82.1	1.51
Toronto	89.0	90.3	90.6	1.57	85.3	86.4	86.0	1.48
Tulsa	89.4	90.2	90.0	2.45	82.0	83.1	83.0	1.63
Vancouver	88.7	89.0	89.9	2.85	83.4	82.7	83.1	2.01
Wichita	87.0	89.2	89.8	2.49	80.7	82.7	83.1	1.88
Winnipeg	88.3	88.8	88.7	1.33	82.4	84.7	84.2	0.68

GENERAL COMPARISONS*

	Apr. 1952	Jan. 1953	Apr. 1953
Premium:			
Research Oct. No.	89.9	90.9	91.0
TEL content (cc. per gallon)	1.94	2.11	2.22
Regular:			
Research Oct. No.	83.2	84.3	84.4
TEL content (cc. per gallon)	1.52	1.79	1.87

*Unweighted averages of 47 cities.

were higher than on any of the surveys in the past 3 years.

Use of TEL . . . Use of tetraethyl lead per gallon in premium gasoline was slightly greater than at the first of the year and 14 per cent greater than a year ago. The peak in use of TEL in premium came at the end of the third quarter of 1950, when the average was 2.39 cc. per gallon. TEL content of regular gasoline averaged 1.87 cc. per gallon, up only about 4 per cent from the first of the year but 23 per cent greater than a year ago.

Seventeen cities reported an average premium-grade gasoline with octane rating above 92 compared with 14 cities at the first of the year. All cities checked on the East Coast had ratings above 92. Cities that moved into the above-92 group on the last survey were Corpus Christi, Louisville, and Shreveport. The highest average ratio reported was 93.2 for Baltimore.

Profits Shrinking

Operating costs of natural-gasoline and cycling plants must be cut to offset rise in gas prices, Vaughan warns N.G.A.A.

F. Lawrence Resen

HOUSTON.—The greatest factor presently challenging the natural-gasoline and cycling-plant phase of the petroleum industry is the increasing value placed on natural gas, which is adding to operating costs.

Rising costs are reducing the plants' margin of profit and it is up to plant designers, equipment manufacturers, and the industry, as a whole, to reduce operating costs per gallon, investment costs per gallon, and help create more favorable markets which will permit a fair return on investments.

These statements were made here by Harold E. Vaughan, Continental Oil Co., Houston, to members attending the thirty-second annual convention of the Natural Gasoline Association of America.

Reporting on "Plant Economics vs. Increasing Cost of Gas," Vaughan compared operating costs in both gasoline plants and cycling plants as based on gas priced at 3 cents per M.c.f. in the 1930's and early 1940's and on gas priced at 20 cents per M.c.f. in 1954. Recently negotiated contracts in the Gulf Coast area of Louisiana have called for the 20-cent price at the beginning of the contract in 1954 and escalating to higher prices during the term of the contract, he said.

Examples cited . . . To illustrate the impact these costs have on net operating revenue, Vaughan first applied the increasing prices to a representative gasoline plant processing 82,000,000 cu. ft. of gas per day from which is extracted about 83,000 gal. of liquid products. The only gas charged against plant operations was plant shrinkage, and that used in the boilers and recompressor engines, with total gas consumption amounting to 6,200,000 cu. ft. per day. All residue gas is credited back to the producers.

When value of gas is 3 cents per M.c.f., the annual net revenue before income tax is $493,037; this assumes the value of gas used in plant operations is charged to the plant. With gas at 10 cents, this net revenue drops to $334,617 and when gas costs 20 cents, the net dwindles to $108,317.

A similar case in a cycling plant processing 173,000,000 cu. ft. of gas per day would find about 10,800,000 cu. ft. per day consumed in plant shrinkage, compression, extraction, and manufacturing operations. At 3 cents this represents a gas cost of $118,260 per year, but at 20 cents per M.c.f. the gas costs would skyrocket to $788,400. Net revenue before taxes would decrease, in turn, from $975,409 per year to only $305,269 per year, he said.

Other factors . . . Additional factors clouding the economic outlook are also helping to reduce net operating income in these plants, Vaughan said, including:

1. Increased taxes imposed on the industry by federal, state, and local legislative bodies. If a trend in some state legislatures to tax gas at the well head continues the industry will face an additional setback.

2. Wages have steadily increased, better than doubling those paid in the early 1940's.

3. Cost of all materials used in such plants have at least doubled and in some cases trebled during the past 12 years.

4. Sales prices of liquid products have not kept pace with increased cost of production.

What must be done . . . The road ahead requires examination of the industry's position on several points to insure that net income of plants will be protected and make the economic climate favorable for continued growth. If gasoline and cycling-plant operations are to continue on a sound economic basis, the following things must be done, Vaughan said:

. . . 1. Examine the most important costs which can be controlled day-to-day.

(a) Job analysis of plant personnel may reveal that by better planning and organization the over-all operation can be accomplished more efficiently with less manpower.

(b) Emphasis on preventive maintenance for reducing operating costs over the life of the project.

(c) Closer supervision over plant operations and plant-control tests to obtain maximum production with minimum outlay.

(d) Eliminate wasting of gas through flaring and reduce steam and electric-power consumption to the bare minimum.

(e) Cost-conscious responsibility instilled in each employe through plant educational programs will pay dividends.

. . . 2. Develop new products and new uses for old products. The petrochemical industry, for example, has been developed almost entirely on this basis, and the natural-gasoline and gas industry faced the problem of excess butane by developing a market for it in the early days, Vaughan said.

. . . 3. Improved designs and processes, and more efficient equipment. In the earlier days, the cost of the residue gas was not a factor to be considered in design as is evidenced by general lack of consideration of economical thermodynamic balance in gasoline plants, Vaughan said.

L.P.G. Problem

More underground storage required in market areas

HOUSTON.—Approximately 3,000,000 bbl. of L.P.G. is now being stored in underground cavities, but the capacity of such storage facilities is expected to double next winter, and by the winter of 1954-55 will increase to 8,500,000 bbl.

These predictions were made by H. R. Thomas of Stanolind Oil and Gas

Co., Tulsa, to members of the N.G.A.A. convention here.

Since World War II, he said, L.P.G. has become a major industry and is reported second only to television in rate of growth. This recent development has made necessary larger-volume storage.

At the present time, Thomas said, approximately 96 per cent of capacity is located in the producing areas of Texas, Louisiana, Mississippi, Oklahoma, and Kansas, while only 4 per cent of underground storage is located in marketing areas outside the producing territory, he said.

The storage in the producing areas is needed and will undoubtedly be increased, but additional underground-storage cavities are needed in market areas to better balance production and transportation of L.P.G. and to assure continuous, reliable supplies for major markets.

Problems remain . . . However, the industry's storage problems cannot be solved at any one or two points, Thomas said. They must be solved by providing adequate storage at each point along the distribution systems.

First, the producing plant or refinery must have adequate storage; second, pipe-line, tank-car, and tanker terminals, where economically justified, must provide an adequate share of the storage, and third, the dealer or distributor bulk plant should provide a minimum of 2 weeks' storage based on peak demand. In some cases two or three times this storage capacity is necessary.

Ultimate-consumer storage is also an important point, he said. A minimum of one-half of consumer year-around fuel requirements should be stored in advance for space heating at the point of consumption.

Underground cavities or other economical large-volume storage have several definite advantages over shipments direct to bulk plants from producing areas, Thomas said. These include:

. . . Assurance of continuous supply during critical peak-demand periods.

. . . Short hauls by truck and smaller tank car fleet during peak-demand periods more efficiently utilizes transportation facilities and reduces operating costs.

. . . Balanced loads for railroads, thus creating better relations.

. . . Reduced steel requirements for storage in market areas, conserving steel during periods of shortages.

. . . Evaporation losses are minimized and fire hazards reduced.

. . . More intensive development of present markets in immediate area and development of new uses and markets.

. . . Producing plants are assured of year-around outlets for maximum production.

DARST E. BUCHANAN

Award Winner

Hanlon Award, top honor of N.G.A.A., given Buchanan

HOUSTON.—The Hanlon award, the highest honor in the natural-gasoline industry and one of the ranking awards of the entire petroleum industry, was conferred on Darst E. Buchanan here April 30 during the thirty-second annual convention of the Natural Gasoline Association of America. Buchanan is president of Hiwan Oil & Gas Co., Houston.

Buchanan is the seventeenth recipient of this award, which is conferred each year by the N.G.A.A. for outstanding service to the natural-gasoline and cycling industries. Donor of the award is E. I. Hanlon, chairman of the board of the National Bank of Tulsa.

Presentation to Buchanan was made by N.G.A.A. president, John F. Lynch, president of the La Gloria Corp., Corpus Christi. The citation read in part: "The natural-gasoline industry owes much to this man's long and sustained efforts to expand the markets for the products of its plants. Few men have ever been as active in this field and none has been more aggressive.

"He began his natural-gasoline selling in 1918. In 1926, as a result of his visit to European refiners, he sold the first cargo of natural gasoline and thus the export market was born. Though primarily interested in marketing, he took an active part in the development of technical standards for testing and manufacturing, activities which stimulated the production of more stable and more marketable products."

Buchanan's former business associations include — purchasing agent for Sapulpa Refining Co. at Sapulpa, Okla.; sales manager for Magda Oil & Refining Co., Tulsa; sales manager and vice president of Chesnut & Smith Corp., Tulsa; president of Hanlon-Buchanan, Inc., president of Hanlon Pipe Line Co., and vice president of Hanlon Gasoline Corp. of Texas.

In addition to his current association with Hiwan, he also is president of Heckethorn Manufacturing & Supply Co., Littleton, Colo.

L.P.G. Test Method

Way to determine liquid content of propane and heavier, isobutane and heavier outlined before N.G.A.A. meeting

HOUSTON.—A weight method for determination of propane and heavier and isobutane and heavier liquid content of natural gases was presented to members of the Natural Gasoline Association of America here by Clare D. Gard, Union Oil Co. of California, Los Angeles.

The test, which involves passing of gas through a plastic tube containing reactivated carbon, and weighing of the tube before and after the run to determine liquid content, is a further modification of the charcoal-test procedure. It was developed by Union Oil under the guidance of R. A. King of the field department.

According to Gard, a study of observed data taken during the many charcoal tests made gave indications that it would be possible to determine components of gas retained by the saturated charcoal, provided that:

1. Suitable weighing of charcoal could be made in the field.

2. Certain factors required for computing results could be provided in table form for convenient use and be of sufficient reliability to be acceptable.

On the basis of these and subsequent observations, a balance of proper accuracy and ruggedness was selected for weighing and the factors were prepared in table form.

How test is run . . . The saturation involves the placing of reactivated charcoal in a light-weight, clear-plastic tube of predetermined weight and weighing the total mass on a beam scale. The tube is next placed on the gas line and evacuated by means of a vacuum

pump. After evacuation and checks for apparatus leaks have been made, the meter is read and the tube saturated with the gas being tested.

Equipment used on the test includes a Nurnberg special charcoal-test thermometer which is inserted into the top of the plastic tube. This is used to check the temperature variations caused by methane, ethane, etc. The saturation is terminated at the first indication of a decrease in temperature after the top of the third temperature rise has been noted. The saturated charcoal will then contain fractions predominantly propane and heavier. The saturated tube is disconnected and the meter reading recorded.

The weighed tube is replaced on the gas line and saturated to start of the fourth temperature rise. The charcoal will then be saturated predominantly with isobutane-and-heavier components. The meter reading is then recorded. To accurately determine the isobutane-and-heavier content of the gas, it becomes necessary to air-fractionate the saturated charcoal.

Test data . . . A series of comparative tests were run using the weight method and fractional analysis to determine contents of gases, and these results were reported by Gard. Propane contents of the gases varied from a minimum of 0.521 to a maximum of 4.33, with corresponding propane and heavier, gallons per thousand, of 1.099 to 24.408. Maximum observed error between weight test, gallons per thousand, and the fractional analysis, gallons per thousands, for the propane and heavier yield was from —6.2 per cent to +7.2 per cent.

Maximum observed error between weight test method and fractional analysis determination of isobutane and heavier was from —7.2 per cent to +8.0 per cent. The maximum observed error between the weight method and the fractional analysis determination for the propane yield was —20 per cent to +9.7 per cent. It was further observed that the weight-method test generally gave a lower gallons per thousand indicated propane test than that of the fractional analysis, Gard said.

ECONOMICS

Inventories Too High

I.P.A.A.'s supply-demand committee says production must be reduced further to avoid greater surplus of stocks

Ted A. Armstrong

ST. LOUIS.—Inventories are too high, and continued crude-oil production at the present rate may mean they will become "burdensome," the Independent Petroleum Association of America was told here last week by its committee on supply and demand.

"To avoid an overaccumulation of inventories, which because of seasonal factors may be particularly pronounced prior to September 30, a moderate reduction in current supply rates will be required," the committee reported.

These reductions, the report said, will be in addition to "the reduction of about 350,000 bbl. daily in domestic production already made since the first of the year."

The committee forecast domestic demand for 1953 at 7,670,000 bbl. per day, an increase of 5.3 per cent compared with 1952. This was in line with its supply and demand forecast made last fall. Total demand, including exports, was placed at 8,030,000 bbl. daily, an increase of 4.1 per cent.

The forecast, the committee said, was based on these assumptions:

. . . International relations will improve, rather than deteriorate.

. . . Industrial activity this summer will be "automatically higher" than in 1952, partly because of last year's strikes. On the other hand, general business activity next winter—October to April 1954—will be lower than last winter.

. . . Foreign oil will be "increasingly significant in international petroleum trade," possibly further augmented by "moderate volumes" of Iranian oil.

. . . Normal weather will prevail.

The committee boosted its old estimate of exports 67,000 bbl. daily to a new expected daily average of 360,000 bbl. for 1953. It pointed out, however, that the increased figure still is 17.4 per cent below actual exports during 1952.

The committee said future production cuts will be needed for this reason:

Domestic production now averages about 6,270,000 bbl. daily of crude and 620,000 bbl. of natural-gas liquids. Imports, averaging an estimated 1,020,000 bbl. daily in this quarter, bring total supply to 7,910,000 bbl. daily, compared with estimated requirements of 7,858,000 bbl. daily during the 6-month summer season.

Details of the new forecast may be found in the accompanying table.

U. S. Petroleum Supply and Demand Forecast

(Thousands of barrels daily)

	First quarter 1953*	Second quarter 1953	Third quarter 1953	Fourth quarter 1953	Year 1953	First quarter 1954
Total demand						
Gasoline	3,145	3,535	3,630	3,375	3,421	3,200
Kerosine	505	240	235	495	369	530
Distillate	1,965	1,110	1,040	1,800	1,479	2,160
Residual	1,860	1,485	1,405	1,745	1,623	1,825
Other products	1,040	1,125	1,265	1,115	1,138	1,040
Total	8,515	7,495	7,575	8,530	8,030	8,755
Exports—						
Gasoline	105	85	80	75	86	75
Kerosine	15	15	15	10	14	10
Distillate	105	80	80	70	84	70
Residual	65	65	55	45	58	45
Other products	55	60	60	55	58	50
Crude	65	65	60	55	60	50
Total	410	370	350	310	360	300
Domestic demand	8,105	7,125	7,225	8,220	7,670	8,455
Total stock change	—241	+385	+261	—332	+18	—427
Total new supply required	8,274	7,880	7,836	8,198	8,048	8,328
Runs to stills	7,007	6,722	6,859	7,012	6,899	7,095
Closing stocks (millions of barrels)—						
Gasoline	163.0	147.0	130.0	140.0	140.0	166.0
Kerosine	18.5	28.0	37.0	28.0	28.0	18.0
Distillate	60.0	83.0	120.0	101.0	101.0	56.0
Residual	41.0	49.0	57.0	50.0	50.0	41.0
Other products & natural gasoline	94.5	99.0	95.0	92.5	92.5	95.0
Crude	275.0	281.0	272.0	269.0	269.0	266.0
Total	652.0	687.0	711.0	680.5	680.5	642.0

*Estimated. Based on Bureau of Mines figures for January and February and A.P.I. data for March.

Interior Budget Cut

Appropriations committee bases move on policy of keeping government out of activity which private firms can handle

Bertram F. Linz

WASHINGTON. — The House appropriations committee has laid down a policy that the Government should not engage in any industrial or business activity which private enterprise can handle.

It backed that rule up by cutting an even one-third from the Truman budget for the operation of the Interior Department during the fiscal year which begins next July 1, with nearly half of the cut applied to the Bureau of Reclamation.

The committee cut the $607,336,400 Truman budget for the department to $404,863,239, a figure of $137,874,262 less than the appropriation for the current year and $80,000,000 less than Secretary Douglas McKay recommended. Only $1,367,000 of the amount cut out by the committee was restored by the House when it passed the bill April 28 with a total of $406,130,343.

The close to $8,000,000 program for synthetic-liquid-fuel development by the Bureau of Mines carried in the Truman budget was slashed to skeleton proportions. The committee accepted McKay's decision to close the demonstration coal-hydrogenation plant at Louisiana, Mo., because, it said, he reported that the work there has brought the cost of producing gasoline down to within a few cents of being commercial competitive with other methods of producing gasoline.

Rifle continued . . . But the committee pointed out the bureau reports it has done even better in reducing the cost of producing gasoline from oil shale at Rifle, Colo., and ordered that plant closed down, too, with the comment that "the bureau appears to have done an excellent job in leading the way in these important developments which are now at the point where private industry can pick them up."

When the bill came up in the House, however, the closing of the two synthetic plants became the subject of a short but heated controversy which wound up with the House restoring $1,217,104 for the continued operation of the Rifle shale plant.

In addition the committee disallowed other funds programed for synthetic liquid fuels except $767,600 for laboratory and pilot-plant research on the new one-step method of coal hydrogenation now being worked out at Bruceton, Pa. An allowance of $500,000 was made for putting the Louisiana and Rifle plants in standby, and the secretary was instructed to dispose of them "in accordance with existing law and agreements which may be in existence between the department and other federal agencies."

The slashing of the synthetic-fuels program was in line with the policy statement made by the committee in sending the Interior appropriation bill to the House floor.

"The Interior Department," it said, "should be concerned with only those functions or activities which private enterprise cannot or will not undertake. Where private enterprise is unable to completely develop resources without assistance, there should be a working partnership between the federal Government and private interests in which the latter should discharge its obligations to the fullest to serve the public interest and place additional property on the tax rolls."

Tidelands Vote Due

Senate passage of Holland bill expected this week

WASHINGTON.—Senate passage of the Holland measure restoring state title to submerged lands within their historic boundaries is due to come this week.

Opponents of state ownership agreed last week to end their talkathon against the measure which started 4 weeks earlier. Their decision came after the Senate, by a vote of 56 to 33 tabled an amendment proposed by Sen. Clinton P. Anderson of New Mexico and the group which has been conducting the filibuster which would have given the federal Government the right to all oil in the submerged lands beyond low-water mark, as provided for in the Supreme Court decisions.

The Senate will start voting late in the afternoon of May 5 and is expected to get to a final vote rather quickly.

Collapse of the filibuster came when Sen. Robert A. Taft of Ohio threatened to keep the Senate in round-the-clock session until the legislation was disposed of. Taft brought the measure nearer final decision by starting to whittle away the amendments by which the Anderson group were seeking to substitute federal for state ownership of the submerged lands within state boundaries.

FPC Reversal

Shift of Northern Natural's gas properties approved

WASHINGTON.—The Federal Power Commission has permitted Northern Natural Gas Co. to divorce itself of its gas-producing properties, thus terminating a lengthy controversy which threatened to prevent enlargement of the company's gas pipe line from the Southwest to the Minnesota-Dakota area *(The Oil and Gas Journal, November 3, 1952, page 69, and November 24, page 80)*.

Last November Northern Natural turned over its producing wells and leases to a new subsidiary, Northern Natural Gas Producing Co., and entered a contract to purchase the gas produced. The new company, not being in the pipe-line business, presumably would not be regulated by the FPC and could sell gas at the prevailing field prices. This was done in defiance of an FPC order expressly forbidding Northern to dispose of any of its gas reserves committed to the service of its line.

The FPC has now dropped the case on the ground that the transaction has not alienated the gas supply from the customers to whom it was dedicated.

This decision may mark a turning point away from the FPC's former policy of attempting to extend its jurisdiction to production and gathering of natural gas and regulation of the producing activities of interstate pipe lines. However, of the five commissioners, Thomas C. Buchanan, in his last act before going out of office, filed a vigorous dissent, a second commissioner concurred in the result only, a third filed a concurring statement, and the other two jointly signed a separate concurrence.

Imports Quota Questioned

WASHINGTON.—Economic effects of a quota on oil imports would not be all to the good, it was warned last week

by Gen. Walter Bedell Smith, Under Secretary of State.

Speaking before the annual meeting of the U. S. Chamber of Commerce, Smith pointed out that currently about 70 per cent of our oil imports originate in Venezuela. Those imports, he said, represent less than 10 per cent of our total consumption but they provide Venezuela with revenue to finance purchases from this country of approximately a half-billion dollars a year.

"Our Venezuelan friends would have to do a good deal of fast talking to their more nationalist-minded countrymen if we shut out Venezuelan oil," Smith said. "This, of course, is without considering the strategic value of Venezuelan oil to our own security."

Cartel Probe Ends

National-security interest prompted move, court told

WASHINGTON.—The Truman-instigated grand jury investigation of an alleged international oil cartel was dropped by the Government April 28, but with the understanding criminal proceedings may be reinstituted if warranted by developments in the civil suit filed by the Department of Justice April 21.

Leonard J. Emmerglick, special assistant to the attorney general, said the decision was based on the interests of national security.

The dropping of the criminal case was no surprise. The action had been anticipated when President Eisenhower took office last January and Attorney General Herbert Brownell, Jr., made a formal announcement of the course he would follow several weeks ago.

There was, however, some reaction from the companies involved. In a statement before a stockholders' meeting, J. S. Leach, chairman of the board of The Texas Co., asserted that the shift in procedure is no advance toward solution of the basic problem of how American companies should operate in foreign fields.

"What is needed is a well-defined national policy toward American business operating in foreign countries," Leach said. "This policy should, of course, promote the proved and traditional principles of American competition and free enterprise. Part of this policy should be to vigorously support American business, not undermine it, when it is conscientiously operating within the defined limits of our national policy.

"There is now an excellent opportunity for the present administration to develop and state such a policy," Leach added.

WATCHING WASHINGTON

Bertram F. Linz

Trade-Act Wrangle On

The House ways and means committee is in the midst of at least 3½ weeks of hearings on extension and amendment of the Reciprocal Trade Agreements Act with advocates of a quota on oil imports confident they will get it and opponents equally confident they will not.

President Eisenhower has confused the issue, as he has others in the past 3 months, by retreating from his original position that the act should be continued for another year without change and consideration of amendments deferred until 1954, when he said the administration will come up with recommendations for improving the law.

Eisenhower's suggestion was given the support of Republican leaders in Congress who later found themselves in a rather embarrassing position when the President told a news conference he would not object to "minor" amendments.

He did not define what he thought minor amendments might be and observers believe that should the House committee start making changes in the act it would open the door for all sorts of modifications which might well include a quota provision.

Coal Boys Squawk

Decision of Interior Secretary Douglas McKay to close down the coal-to-oil demonstration plant at Louisiana, Mo., has run into protests from John L. Lewis and members of Congress from the coal-producing states.

Lewis, in a letter to McKay, said he could understand the desire to economize in Government but was "appalled" at the long-range consequences of closing the plant which, he charged, "reveals the absence of a forward look to the fuel situation which will inevitably confront us."

In a quick move to keep the synthetic liquid-fuels development alive, Rep. Carl D. Perkins of Kentucky introduced legislation in Congress to encourage private industry to get into the field by providing financial assistance through the Reconstruction Finance Corp. for the building of plants in such numbers as to supplement supplies of oil and products. The bill provides that if private industry fails to take advantage of this opportunity the Government should build plants and lease them to private operators, and carries an appropriation of $350,000,000 to cover the cost of such construction.

In his letter to McKay, Lewis expressed concern over the effect of the closing of the Louisiana plant on the coal industry. He said McKay should have asked congressional approval of the move, to prevent the loss to the government of the highly trained technicians and professional men who have been engaged in the research.

How Expensive an Attack?

What it would cost in terms of money, materials, manpower, and time to rebuild industrial facilities that might be destroyed in an atomic attack on the United States is engaging the attention of civil-defense authorities.

A number of such studies are being made in vital industries. They are designed to develop just what would be needed to restore a pipe line, refinery, railroad, public utility, and factory that might be bombed.

Because no two plants are normally identical the cost estimates will, of course, be generalized in nature but they will be adequate for the job of estimating what it would take to replace a bombed facility.

The cost figures are not being compiled on a nation-wide basis for any industry. Instead, the industrial centers most likely to be attacked in the event of war are being surveyed. Studies already have been made by the National Security Resources Board of the protective measures that could be taken by industries in such areas to minimize the effects of an attack. The work has been transferred to the Office of Defense Mobilization and will be expanded.

Officials are hopeful that individual companies will cooperate in the work by developing their own engineering studies of what would be needed to get their facilities back into operation in the event of attack, always keeping in mind the fact that in the event of an emergency, materials, particularly items of equipment, would immediately be in short supply and it would be necessary to adopt "make-do" expedients.

NEW OFFICERS of the Rocky Mountain section of the American Association of Petroleum Geologists and chairman of the 1954 A.A.P.G. annual convention. Left to right are Graham B. Moody, Standard Oil Co. of California, San Francisco, convention chairman; Jack Cooper, Continental Oil Co., Durango, Colo., secretary-treasurer; Paul H. Umbach, consulting geologist, Albuquerque, N. M., and Denver, president; and Andrew G. Alpha, United States Smelting, Refining & Mining Co., Billings, Mont., vice president.

Geologists Meet

Over 1,300 attend Rocky Mountain A.A.P.G. meetings; geology of area discussed in 20 regional, 4 field papers

Philip C. Ingalls

CASPER, Wyo. — Geology of the Rocky Mountain region from the Four Corners area of Utah, Arizona, Colorado, and New Mexico, to the northern limit of the Williston basin in Saskatchewan was discussed in 20 regional and 4 field papers during the annual meeting of the Rocky Mountain Section of the American Association of Petroleum Geologists here April 23-24.

More than 1,300 geologists from the United States and Canada attended the 2-day session, half of which was devoted to a discussion of the rocks and oil fields of the Williston basin. *(See page 179 for a brief summary of this symposium.)*

In his address of welcome, Prof. Horace D. Thomas, University of Wyoming, said the spirit of the original pioneers was still evident in Wyoming and especially in those searching for oil in the state's many basins. The address of Alex Clark, Williston Oil & Gas Co., Casper, outgoing president of the Rocky Mountain Section of the A.A.P.G., pointed to the recent rapid growth in the number of geologists working in the Rocky Mountain area as a measure of the interest the big, sparsely tested area is attracting.

Sediment study important . . . In his paper on "Tectonics and Its Relation to Oil and Gas Production in the Four Corners Area," Paul Umbach, consulting geologist, Albuquerque and Denver, said that a study of the changes in the type of sediments is more important than the mapping of local anticlinal structures in the Four Corners area. This is indicated, he said, by the large number of successful wildcat wells drilled for stratigraphic traps as a result of detailed study of the sediments compared with the number of successful wildcats drilled on anticlinal structures without regard to the types of sediments.

John Maher, Geological Survey, Tulsa, told of his recent and continuing studies of the Paleozoic history of southeastern Colorado and adjacent areas including parts of three major structural basins: the Hugoton embayment of the Anadarko basin, the Denver basin, and the Raton basin. Maher traced the history of Paleozoic seas from late Cambrian through Permian time and gave detail of the lithologic changes in the Permian and Pennsylvanian rocks from western Kansas to the Front Range in Colorado. He said the Las Animas flexure, currently of high interest in Denver basin exploratory work, seems to have had its beginnings near the end of Missouri time.

Big Horn reservoirs . . . A discussion of traps and reservoirs in the Phosphoria and Tensleep formations of the Big Horn basin was presented by John R. Fanshawe, consulting geologist, Billings, Mont. Fanshawe's conclusions were that reservoirs modified least by mechanical and chemical effect of artesian waters are those which most closely approximate the original conditions of petroleum generation and entrapment. These reservoirs, he said, are in the deeper part of the basin, or in traps where pressure alone, rather than motion and pressure, holds the hydrocarbons and associated substances in place.

E. C. Reed, Nebraska Geological Survey, told of the present knowledge of Paleozoic geological history of the Denver basin and adjacent parts of western Nebraska and northwestern Kansas. He said that Pennsylvanian and Permian rocks occur extensively below Jurassic sediments in the Denver basin with progressive changes from the typical lithologies of eastern Kansas and southeastern Nebraska to the significantly different lithologies of eastern Wyoming and southwestern South Dakota. Pre-Pennsylvanian rocks, however, have not been traced through the basin between outcrops southeast and northwest of the basin. But, he said, there is evidence of a broad, northeast-southwest trending band through the basin where Pennsylvanian rocks rest on pre-Cambrian and that it appears that the Mississippian rocks rest on progressively older pre-Mississippian rocks as this area is approached.

It was announced at the meeting that next year's annual meeting of the Rocky Mountain section of the A.A.P.G. will be held in Albuquerque.

Standby Capacity

Teaming supply-demand with defense needs tough

CASPER, Wyo.—How can the oil industry maintain the reserve producing capacity requested by the Government to afford ample national security in the event of war?

This, according to L. F. McCollum, keynote speaker at the annual meeting of the Rocky Mountain Section of the American Association of Petroleum Geologists held here April 23-24, is a "very real problem," and "as yet, no concrete and permanent solution has been advanced."

However, he said, "I am convinced this problem will be solved if the oil industry is permitted to operate unfettered by too much control and regulation."

McCollum, president of Continental

TCC Unit at Trenton Refinery

Chicago Bridge & Iron Company built the single zone kiln, stainless clad reactor, hot catalyst tank, separator surge tank, and other important items for this TCC unit. C. F. Braun and Company were the engineers for the unit which is located at Socony-Vacuum Oil Company's Trenton, Michigan, refinery.

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Oil Co., Houston, cited figures showing that the domestic industry has more than 1,000,000 bbl. daily of excess productive capacity and 1,000,000 bbl. daily standby refinery capacity; that above-ground stocks of petroleum products are excessive; that the four major products at the end of the first quarter of this year were 9 per cent above 1 year ago; that above-ground crude-oil stocks are excessive; and that imports have reached a level at which they are generally considered burdensome. He said, "Under these conditions we see the immutable and inexorable workings of the age-old law of supply and demand."

Future uncertain . . . "Not one of us is in a position," McCollum said, "to forecast with accuracy what the future shall bring. The sagging economic activity of our country in the immediate future should not, however, fill us with consternation." Though readjustments may be necessary and perhaps desirable, serious dislocations do not appear imminent, McCollum said.

"To some extent the upsurge in business activity during recent years has been brought about by the need for building a strong defense machine. As this plant nears completion and as defense expeditures decline from peak levels, temporary adjustments in our economy may occur." He added that during this time it appears the oil industry is possibly in a better position than many others to weather the adjustment without serious impairment provided restraint, judgment, and statesmanlike actions are adopted by everyone in the industry. McCollum said that the increasing rate of demand for petroleum products leaves little doubt that the oil industry will continue to grow.

Incentives may suffer . . . McCollum cautioned that, faced with a large reserve productive capacity of crude oil at a time when the American businessman fears a slowdown in business activity, economic incentives may not remain as great, and the pace of exploration may continue to be retarded. He said that if this adjustment be too severe or rapid or last for an extended period of time, our reserve capacity will deteriorate.

Addressing his remarks specifically to the geologists present, McCollum said, "You can play an important role in helping build a bulwark for the future defense and economic progress of our nation. During the time when economic incentives are lagging and, as a consequence, activity is subsiding, there is a reserve which you can create upon which we can draw in the future. This reserve is 'knowledge.' During periods of reduced activity in the oil industry, we should set about to build up our storehouse of knowledge—knowledge of conditions and places where oil can be discovered or produced. Then when economic incentives recur and demand returns, you can point your finger to hidden reserves that can be more quickly reduced to use."

Economy essential . . . McCollum said that in order to mtaintain the industry in the strongest possible financial position during any period of economic readjustment, operations should be studied with a view to reducing operating costs without impairing efficiency. Speaking parenthetically, he suggested that one way to accomplish this would be for the Bureau of Internal Revenue to reverse its present policy of the requirements of capitalization of a large portion of geological and geophysical expense and thus provide additional incentive to expand exploration. Another way, he said, would be for the Government to permit the industry to determine its own depreciation rates on lease and well equipment, as well as all other types of depreciable equipment.

MID-CONTINENT

TOP EXECUTIVES of Sinclair Pipe Line Co. at wall map showing the company's system. Left to right are Roy J. Tibbets, chairman of the board; Robert C. Bearden, executive vice president; William H. Morris, president; and A. A. Davidson, part-interest executive.

Line Dedicated

Spencer says it reaffirms faith in future of U. S. oil

BELIEF that the Mid-Continent will find and produce as much oil in the future as it has in the past prompted Sinclair Pipe Line Co. to spend $52,000,000 for its new crude line from Cushing, Okla., to Chicago, P. C. Spencer, president of Sinclair Oil Corp., said at Tulsa April 27 in a ceremony dedicating the new line.

Sinclair's oil line from the Mid-Continent to its Chicago refinery was about worn out, parts of it being nearly 50 years old, and was obsolete and inefficient, Spencer said. When it was suggested replacing the old system with a new 24 and 22-in line there were some in the company who felt that there would not be enough oil produced in the area to amortize the line in 25 years, or that foreign oil would supplant Mid-Continent oil, he said.

However, Spencer said, the company had sufficient faith in the future of the domestic oil industry in this area to go ahead with the project for an entirely new big-inch crude line. The line is now in operation with a throughput of 175,000 bbl. per day and a capacity of 280,000 bbl. per day.

Dry-Gas Tax Favored

OKLAHOMA CITY. — A recommendation of a special investigating committee that a 1-cent tax be levied for each 1,000 cu. ft. of dry natural gas produced in the state has been adopted by the Oklahoma House of Representatives. The recommendation would not affect residue gas.

The committee reported that two-thirds of the dry gas produced in Oklahoma is being exported, while state firms are having to build pipe lines to Texas to get enough gas to supply their customers.

Committee members estimate the tax would bring in an annual revenue of between $3,000,000 and $3,500,000, two-thirds of which would be paid by nonresidents of the state.

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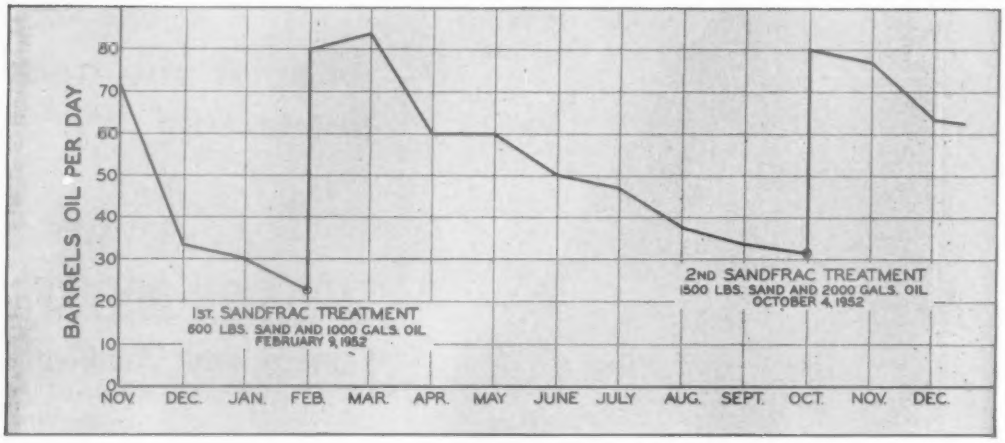

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MIDDLE EAST

Iran Offers Bargain

Half-price rate to all dollar buyers good for 6 months but it isn't expected to attract a big volume of business

Dahl M. Duff

CRUDE oil and products from the nationalized properties of Anglo-Iranian Oil Co., Ltd., are now available to virtually all dollar buyers at half the prevailing Persian Gulf price.

Iran announced last week that it will sell at this 50 per cent reduction to any purchasers in the United States and Japan. The government said the offer would be good for 6 months with the stipulation that payment be made in dollars. It was attributed to Iran's severe shortage of dollar revenue.

Since the British were forced out in 1951, the National Iranian Oil Co. has been successful in exporting six cargoes, five to Italy and one to a Japanese marketing company. Previously Iran announced a 50 per cent discount for the Italian company, Supor, which brought the first shipment to Italy.

Although the added price inducement may be attractive to some unaffiliated groups in the United States and abroad, it is unlikely to develop any substantial volume of business. The deterrents to buying Iranian oil for many companies lie in the basic objection to dealing in what the British have called stolen property. Even if this is disregarded, exporters face almost certain court action by Anglo-Iranian, which contends it still owns any production in the absence of a settlement that includes compensation.

In Rome, an Italian court set May 19 as the date for hearing the British company's suit against Supor for ownership of the Miriella's Iranian oil cargo. Similar hearings are to be held during May on other Anglo-Iranian suits against Supor for two additional cargoes brought later in the Miriella and the Alba.

Japan suit pending . . . The Japanese tanker Nissyo Maru was en route to Japan with about 126,000 bbl. of fuel oil and gasoline. The vessel was ordered to steer clear of the Malacca Strait and avoid British-controlled Singapore. An official of the Idemitsu Kosan company said tentative plans have been made to unload the oil at Tokuyama, the port of Yamaguchi, where the company has storage facilities.

The Japanese Government was preparing a reply to the British Government's request for information on the Iranian shipment. Although Japan was expected to tell Britain that it was not in a position to control private imports and that it had no knowledge of the Nissyo Maru's cargo until it became known publicly there were strong indications that government officials in Tokyo would discourage further Iranian trade because of possible injury to British-Japanese relations.

A legal adviser to the British Embassy in Tokyo returned from conferences in London on the matter, and it was expected that the Nissyo Maru would be subjected to court proceedings when it arrives in Japan.

Workers sought . . . Another note on the Iranian situation came from Mexico. The Mexican Oil Workers Union reported that Iran was trying to recruit Mexican technicians for employment in the nationalized oil industry.

The Mexican union said the Iranians asked for 20 petroleum engineers, 100 refinery specialists, and 20 pipe-line men, offering 2-year contracts with dollar salaries 20 per cent over United States wages, along with air transportation to and from the Middle East.

Second Well Started

Neutral Zone confirmation well expected to reach Burgan sand in May, will test Arab zone; discovery still testing

THE second well of American Independent Oil Co. in the Saudi Arabi-Kuwait Neutral Zone last week was down 300 ft. and preparing to set 20-in. surface pipe. It was spudded in April 26.

Situated on what is believed to be the high of the structure discovered by the company's Wafra 4 wildcat, the well is expected to tap the Burgan sand within a month.

A company spokesman said that with a normal drilling rate the well could reach the producing formations in about 3 weeks but that it planned to core two or three sections between 1,100 and 2,700 ft., where a heavy flow of low-gravity oil was found in the discovery well, and also core through the cap rock into the First Burgan sand.

The discovery well, which flowed at a rate as high as 4,000 bbl. daily on tests, last week was shut in, but the company planned to continue testing with various chokes from the three different producing sands.

If the well now drilling, the Wafra No. 5, is found to be high on the structure, the company plans to go on down to test the members of the Arab zone, expected at about 7,500 ft.

The company planned to set 20-in. surface pipe at about 400 ft. because of unconsolidated rocks in that section. In the discovery well, a lost-circulation zone was found immediately below this depth, and the company planned to set 13⅜-in. pipe through this area to a solid formation.

Development plans . . . American Independent said it has no plans for shipping additional rigs from the United States, but is considering renting rigs now available in the Middle East. It was understood that such negotiations had not yet been approved by Pacific Western Oil Co., which holds a half interest in the Neutral Zone operations.

The company also reported that engineering studies are now under way on shipping and handling facilities to move the crude oil to the coast, about 25 miles away, and permit tanker loading. However, it was emphasized there would be no equipment bought or facilities constructed until sufficient development has been accomplished to bear out the company's belief that a major producing area has been discovered.

Background . . . The Wafra 4 found oil late in March, climaxing a 4-year search in which five dry holes had been drilled and an estimated $30,000,000 had been spent in the Neutral Zone search.

Operations were begun in the area in 1949, after a concession covering the area had been granted American Independent by Kuwait and a similar concession had been granted Pacific Western by Saudi Arabia.

(For concession terms and other details, see The Oil and Gas Journal, March 30, page 77).

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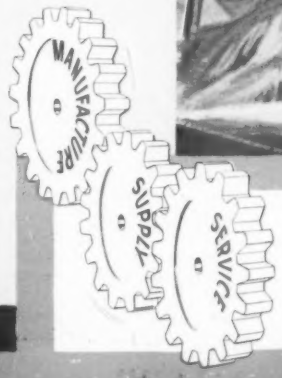
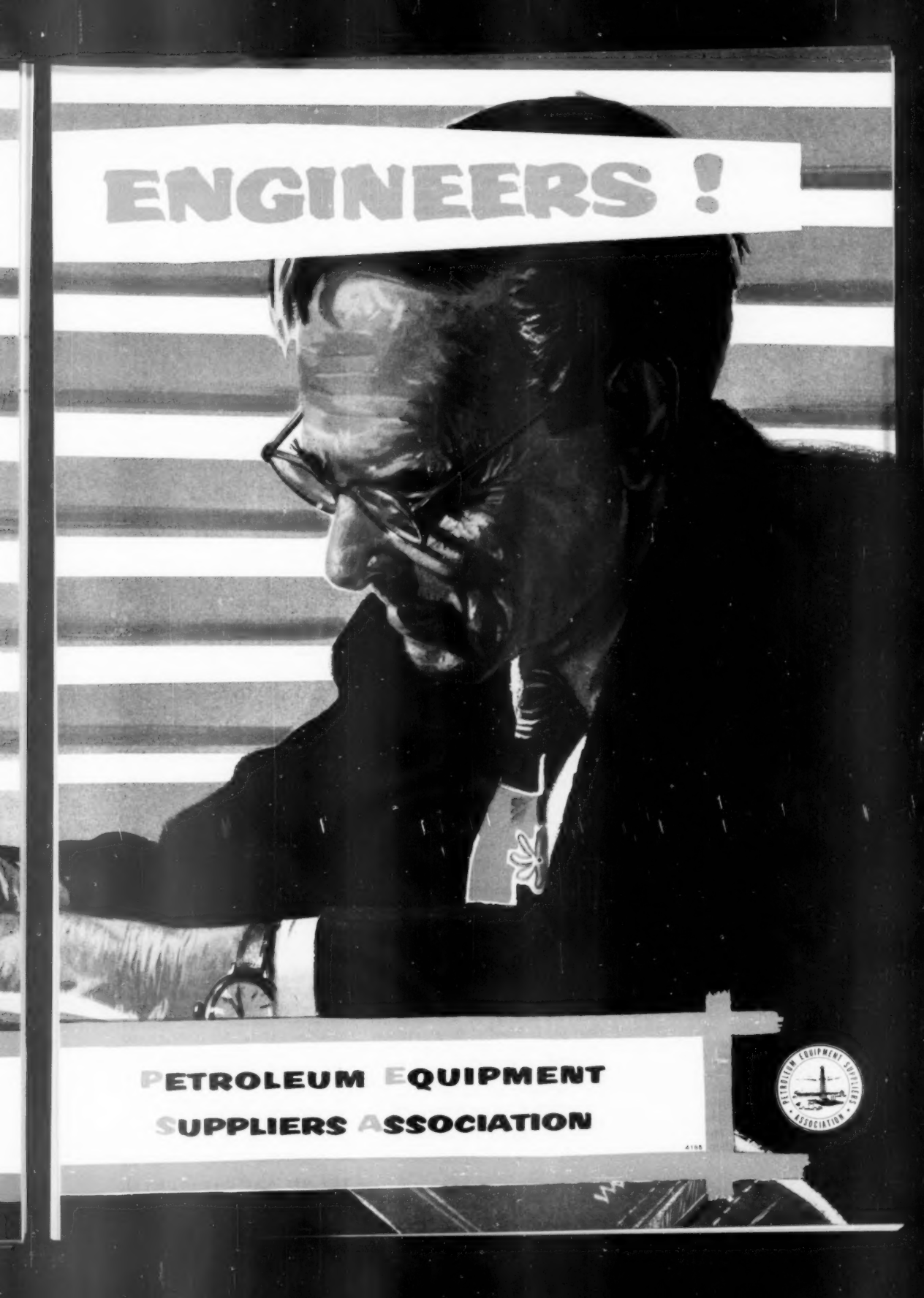
That the service is big is shown by the heavy investment of manufacture-supply-service companies in scientific and engineering talent, and in billions of dollars in plant and equipment.

That the profit is small and the vision and faith great is shown by: 1. the small average dividends paid — 1.74%; 2. the average earnings plowed back into the building up of the companies in order to better serve the oil industry — 4.76%.

The petroleum manufacture-supply-service industry is truly rendering progressive, intelligent, and conscientious service to one of the world's greatest industries — oil.




ENGINEERS !
PETROLEUM EQUIPMENT
SUPPLIERS ASSOCIATION
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ASIA

Guarantees Asked

Royal Dutch-Shell wary on resuming Indonesian work

ROYAL DUTCH-SHELL is asking the Indonesian Government for three guarantees as a condition to new investment and expansion of its oil properties.

In Jakarta, M. J. Bolderdijk, a director of the company, disclosed that Royal Dutch-Shell has formulated plans to increase its capital investment in the Indonesian oil industry by $400,000,000 over the next 10 years.

The expenditures were predicted on the following guarantees from the government:

1. Return of the company's legal rights in North Sumatra and Central Java.

2. Maintenance of law and order in the country.

3. A new economic policy under which the government would share in oil profits on a 50-50 basis.

The Royal Dutch-Shell proposals represented a significant new effort to end the long stalemate over tax, legal, and other matters which has discouraged new investment in the Indonesian petroleum industry. The Royal Dutch Company originated in what is now Indonesia, and it is the country's largest producer with about 90,000 bbl. daily of the total approximately 185,000 bbl. daily.

In an interview in the Indonesian capital, Bolderdijk said he felt "quite optimistic over the settlement of these issues," and that he patiently awaited the decision of the government. He said that if the company launches its 10-year program, Indonesian oil production would be increased by 3,000,000 tons (roughly 60,000 bbl. daily) each year.

The company's field and refining properties in North Sumatra and Central Java were seized shortly after the war by Indonesian nationalists, and the company has been prevented from returning to the areas. Their disposition has become a political issue with certain elements clamoring for their full nationalization.

"Just return" wanted . . . Bolderdijk said rehabilitation of the North Sumatra properties would cost the equivalent of $10,000,000 and that, to make this investment, the company must have guarantees for a "just return of profits."

Industry sources report that the various taxes and other levies on the industry in Indonesia represent a 65 per cent share of profits of the operations. Standard Vacuum Oil Co., second-largest operator in the country, was unable to reach an agreement with the government last year to replace the "let-alone" contract negotiated after the war. This allowed the company use of its foreign-currency earnings for rehabilitation of war-damaged facilities. Shell's postwar agreement is reported to run until 1955.

LATIN AMERICA

Mexico Halts Imports

A decree by Mexican President Cortines has halted the import of gasoline and certain other products into Mexican border areas by private companies.

The decree gives Petroleos Mexicanos exclusive authority to supply these areas with exceptions in the so-called free zones and in Lower California. Because of a shortage of refining capacity and transportation in Mexico, border areas have long been supplied with fuel and lubricants by private distribution companies under contract with Pemex.

Continued imports of this nature will be necessary, but they will be handled by the government oil organization.

EUROPE

Britain Lifts Price Lid

The British Government has removed remaining controls on prices of petroleum products.

Geoffrey Lloyd, minister of fuel and power, announced in London that since petroleum products are now in "ample supply," he had decided that there was no longer any need to control their prices.

Major British companies last week announced a price reduction of about a cent a gallon in gasoline prices due to lower tanker freight rates. The reduction brings the pump price of the standard grade down to about the equivalent of about 48½ cents a gallon (U. S.), nearly two-thirds of which is tax.

Czechs Cite Oil Advances

THESE are two views of oil operations behind the Iron Curtain in Eastern Europe. The pictures are distributed by Eastfoto agency and show activity in Czechoslovakia's fields.

The captions supplied with the photos read: (left) "Modern Soviet methods for transporting derricks to new locations help to save from 7 to 10 days formerly needed for the dismantling and assembling of the derrick"; and (right) "Use of Soviet drilling methods helped the Stefan Petranek crew to fulfill its norm by 138 per cent."

In the first picture a derrick is being skidded by four Caterpillar tractors; the second is obviously a cleanout or servicing operation in a pumping well.

Czechoslovakia is one of the smallest of the oil-producing countries in the Russian satellite area. The indicated production goal for 1953 is about 4,000 bbl. daily, which, though more than three times the reported 1950 output, is still only a minor part of total Czechoslovakian requirements. All crude production in the country comes from the region extending northeast from Central Moravia along the river Morava toward Bratislava.

Heads New Firm

Robert L. Kidd formerly was Cities Service veep

ROBERT L. KIDD has assumed duties in Shreveport as president of the newly formed Arkansas Fuel Oil Corp. *(The Oil and Gas Journal, April 27, page 126).*

Kidd, 51, has been a vice president and member of the board of directors of Cities Service Oil Co. (Del.) at Bartlesville, Okla., the past several years. In that capacity he has been in charge of the company's production and exploration activities.

He is a native of Brazil, Ind., and received a bachelor's degree from Indiana University. He began his career in coal mining and sales work and joined Cities Service in 1925 as a geologist. For the next 20 years he served in many areas in geological and geophysical work and later became chief of the geology and geophysics departments of Cities Service.

Kidd was appointed manager of the land and geological division in 1945 and 6 years later became a vice president. He also is a vice president and director of Canada-Cities Service Petroleum Corp., and president and director of Cities Production Corp.

Dwight Bingham has been appointed district geologist for D. D. Feldman Oil & Gas, Dallas, at the firm's new district offices in Lafayette, La. He formerly was with British-American Oil Producing Co. **Robert Cordell,** formerly with F. A. Callery, has been named geologist at Lafayette. **Eugene E. Conant,** formerly with United Geophysical, Inc., at Midland, Tex., has joined Feldman at Dallas as a geophysicist.

Sidney M. Groom, Jr., Ardmore, Okla., has been appointed by **Douglas McKay,** secretary of the interior, to be a special assistant to **Clarence A. Davis,** solicitor. Groom will be assigned to matters concerning public lands and oil and gas.

C. F. Elder has been promoted to assistant to the Oklahoma division manager of The Texas Co.'s producing department at Tulsa. He has been division petroleum engineer since 1951. **G. M. Bell,** assistant division petroleum engineer, has been named to succeed Elder.

Dr. I. I. Gardescu has resigned as vice president of Transcontinental Gas Pipe Line Corp., Houston, following a disagreement with the company board of directors. A successor to Dr. Gardescu has not been named.

Fred Halloway, who headed the technical division of Esso Standard Oil Co. at Baton Rouge, La., has been named general superintendent of the company's Bayonne, N. J., refinery, succeeding **J. P. Warner** who was promoted to assistant general manager of the company's Louisiana manufacturing division in Baton Rouge.

Richard Steinhorst, Jr., has been appointed assistant to the general superintendent of production of British-American Oil Producing Co., Dallas. He has been assistant district superintendent in the Illinois basin since 1948 and formerly was with The Texas Co. He joined British-American in 1944.

Stacy Jones has been elected president and general manager of Eureka Pipe Line Co., Parkersburg, W. Va. He has been acting president since the death of M. J. Leonard last March 3. **J. A. Bornmann,** Charleston, was named vice president, and **R. R. Runser,** Parkersburg, was elected secretary-treasurer. Directors elected by the board include: **F. G. Bannerot, Jr.,** Charleston; **W. R. Reitz,** Oil City, Pa.; **Allan Reid, R. G. Runser,** and Jones, all of Parkersburg.

Sidney A. Swensrud, president of Gulf Oil Corp. since 1948, has been elected chairman of the board of directors, thus becoming the company's chief executive officer. **William K. Whiteford,** formerly executive vice president, has been elected president and chief administrative officer. **F. C. W. Paton,** formerly general manager in charge of marketing, has been named vice president in charge of foreign marketing. **J. Frank Drake,** after

S. A. SWENSRUD

W. K. WHITEFORD

serving the past 5 years as chairman of the board and the previous 17 years as president, has assumed a less active role as chairman of the executive committee.

Dr. Charles L. Thomas, formerly manager of Sun Oil Co.'s research laboratory at Norwood, Pa., has been appointed associate director of the department in charge of all line activities. His headquarters will be at Marcus Hook, Pa., where Sun currently is building additional laboratories. Newly created staff positions as assistant directors will be filled by **Norman Thompson,** formerly assistant superintendent at the Marcus Hook refinery; **John G. Moxey, Jr.,** formerly manager of the automotive laboratory; and **James I. Harper,** formerly chief of the process-development section in the development laboratory. The office of assistant directors will be in general office buildings in Philadelphia. **W. Herman Barcus,** formerly manager of the development laboratory, has been named manager of the new products-development division at Marcus Hook. **Earl M. Honeycutt,** formerly of the process-development section, will manage the new process-development division at Marcus Hook. **Dr. Robert M. Kennedy,** formerly of the research laboratory, has been appointed manager of the basic-research division at Norwood. **Stewart S. Kurtz, Jr.,** has been named manager of the analytical division at Marcus Hook. **William A. Casey,** formerly chief of the technical service section of the development laboratory, will manage the technical service divi-

PERSONALS

sion at Marcus Hook. **J. Harold Perrine,** formerly administrative associate, has been appointed manager of the administrative division.

James F. McLaughlin, engineering trainee for Sohio Petroleum Co. at Oklahoma City, has been promoted to junior engineer at Russell, Kans.

Vincent P. Sweeney, Jr., assistant petroleum engineer for Ohio Oil Co., has been transferred from Sidney, Neb., to the division office at Casper, Wyo.

Carroll Malinowsky, production engineer for Skelly Oil Co., has been transferred from Russell, Kans., to Monahans, Tex.

Arvis M. Smith, associate engineer for Tide Water Associated Oil Co. at Palestine, Tex., has been promoted to senior gas tester at Midland, Tex.

Ben Mayberry has been promoted to associate production engineer for Atlantic Refining Co. at Corpus Christi. He formerly was district production engineer at Great Bend, Kans.

Fred Lillibridge has resigned as a geologist for Amstutz & Yates, Inc., at Wichita, to become an independent operator there.

William H. Farrand, executive vice president of Rainbow Oil, Ltd., has been elected a director of the company.

B. M. Bradley, engineer for Carter Oil Co. at St. Elmo, Ill., has been transferred to Mattoon, Ill., as assistant division engineer.

James W. Vanderbeek, division geophysical coordinator for Stanolind Oil & Gas Co. at Casper, Wyo., has been promoted to district geologist at Bismarck, N. D.

Douglas E. Acosta, part-time driller for Humble Oil & Refining Co. in the Louisiana division, has been promoted to full-time rotary driller in the Grand Isle district. Other changes include: **James W. Whitener,** promoted to farm boss at Government Wells; **Monroe R. Wolters,** assistant division civil engineer in the East Texas division, transferred to the Houston office, civil-engineering division, for a 1-year training assignment; and **Woodrow W. Bain,** Mallalieu district civil engineer, transferred to the gas-construction division at Houston.

George Jenkins, district geologist for La Gloria Corp., at Shreveport, will be transferred soon to Lafayette, La. He formerly was with Stanolind Oil & Gas Co. and Union Oil Co. of California.

R. W. GEMMER

R. W. Gemmer has been appointed to the newly created position of northern division manager for Carter Oil Co. at Billings, Mont. He has been exploration manager for the northern division at Billings since last year. Division managers in four other operating areas also were named. **O. D. Harper,** who will

A. R. WEST

J. J. MULLANE

be eastern division manager at Mattoon, Ill., has been superintendent of that division since 1951. **A. R. West,** new southern division manager at

O. D. HARPER

G. E. WAGONER

Shreveport, has been acting manager of the production department since 1948. **George E. Wagoner,** who becomes new western division manager at Denver, has been exploration manager at Shreveport the past 6 years. Central division manager at Oklahoma City will be **J. J. Mullane,** who for 4 years was executive assistant in the production coordination department of Standard Oil Co. (N. J.) in New York and returned to Carter's production department last year. **R. W. Beck** has been appointed southern division exploration manager and **H. R. Shannon,** division production manager at Shreveport. Other appointments include: **L. C. Lamar, Tulsa,** named exploration manager of the northern division; **R. S. Frazier,** division engineer, named division production manager at Denver; and **James L. Rogers,** appointed central division production manager.

Hugh Story has been appointed West Texas district manager for Hancock Oil Co. at Midland. He formerly was West Texas district landman.

M. C. Hoover, formerly vice president in charge of the land and geological departments of Murphy Corp., El Dorado, Ark., has been appointed vice president and manager of the exploration department. **C. J. Hoke,** chief geologist, has been named assistant manager of exploration. **Gordon Kirby** has been appointed district exploration manager at Billings, Mont., where the subdistrict office has been elevated to district status. Kirby formerly was district geologist at Denver. **Stratton Bull,** formerly assistant district geologist in the Ark-La-Tex district, has been appointed district geologist at Billings. **R. L. Grady,** formerly land manager at El Dorado, has been transferred to Denver as district exploration manager. **Glenn Fedderson** has been appointed district geologist at Denver. Effective June 15, the Ark-La-Tex district office will be moved to Shreveport and **P. T. Landes, Jr.,** will be district exploration manager there. **J. L. Pierce,** formerly district landman at Midland, Tex., has been appointed district exploration manager there.

Francis J. Powers, assistant to the general superintendent at Esso Standard Oil Co.'s Bayonne, N. J., refinery, has been named coordinator of the refinery's modernization program. **John A. Norton** has been appointed process superintendent to succeed **Charles E. Borgstrand,** who has been transferred to the lube and specialty division of the manufacturing department in New York. **John H. Bannon** has been transferred from the Bayway refinery to become mechanical superintendent at Bayonne, replacing **Vernon L. Atkinson,** assigned to the staff of the company's chief safety engineer at Bayway. Succeeding Bannon as superintendent of maintenance and construction at Bayway is **Eugene C. Hermann,** formerly assistant head of the chemical products department. **Wilbur V. Hunt** has been promoted to assistant process superintendent at Bayonne, and **William K. McOwen** has been named head of the refinery's operations-analysis department.

PERSONALS

John O. Campbell, Jr., has been named head of a newly established natural gas and gas-products section in the crude-oil-purchasing department of Carter Oil Co. He has been general gasoline superintendent in Carter's production department since 1948.

R. J. Ostrander has been appointed assistant to **Dan M. Guy,** director of technical service at the research laboratories of Ethyl Corp. in Detroit. He will be succeeded as supervisor of motor vehicle operations by **H. A. Toulmin. Gerald Stanke** has been named to the newly created position of assistant research supervisor for motor vehicle operations at the laboratories.

Jerry D. Stafford has been promoted to district production engineer for Atlantic Refining Co. at Great Bend, Kans. Other company personnel changes include: **Norman W. Ley,** transferred from Lake Charles, La., to Casper as geologist; **Marion W. Ziober,** to junior production engineer at Denver City, Tex.; **Robert W. Drake,** transferred from Longview to Greggton, Tex., as assistant production engineer; **Gerald C. Merket,** transferred from Odessa to Tyler, Tex., as a geologist; and **Max F. Hentz,** promoted to geologist at Tyler.

D. S. Alcorn, who for the past 4 years has been a technical representative in the Baltimore district office of Union Carbide & Carbon Corp., has been transferred to New York to assist with the market development of chemicals produced at the new coal-hydrogenation plant at Institute, W. Va.

Charles E. Phillips has joined Robert W. Harrison & Co., Houston petroleum engineers and geologists, as petroleum reservoir engineer. For the past 5 years he has been senior reservoir and reserves engineer for Standard Oil Co. of Texas. He is a graduate of Texas A. & M. College.

Charles F. Feuchter has completed his tour of duty as special assistant to the director of refining of the Petroleum Administration for Defense, and has returned to Pan American Refining Corp., New York, as assistant to the president. **Dr. J. E. Kasch,** who has been assigned to the New York office temporarily, will return in late summer to the Texas City, Tex., refinery, where he will resume his duties as assistant director of research and development.

Allerton Miller has been named vice president of Texas Gas Transmission Corp., Owensboro, Ky. He formerly was secretary of the company. Miller is a member of the Texas Gas board of directors and a 1939 graduate of Princeton University.

Glenn W. Wilson has been promoted to section head in the technical service section of Humble Oil & Refining Co.'s Baytown, Tex., refinery. The section was formed to handle technical-service activities associated with rerun distillation and light-oil treating. For the past 2 years Wilson has been a specialist in design and operation of fractionating towers.

A. L. Carpenter, petroleum engineer for Humble Oil & Refining Co. at Midland, Tex., has been transferred to the Stanton, Tex., district as petroleum engineer. **J. E. Dozier,** tool pusher, has been transferred from the Means, Tex., to the Hobbs, N. M., district.

DEATHS

Lawrence Vincent Shaughnessy, 40, finance counselor for the Petroleum Administration for Defense, died in Washington April 23. Formerly connected with Sinclair Refining Co., he served during the war as a marketing specialist in the Petroleum Administration for War and later was deputy war assets administrator in Honolulu.

Fred R. Smith, 70, retired production-department superintendent for Gulf Oil Corp., died April 27 of a heart attack at his home in Tulsa. He retired in 1948 after 40 years with Gulf and its predecessor, Gypsy Oil Co.

Raymond E. Roehrenbeck, 48, lubricating engineer for Swan-Finch Oil Corp., New York, died April 26 in New York.

Tom F. Hunter, 63, Wichita Falls, who was active in the oil-producing and drilling business, died April 26 following a heart attack at Port Isabel, Tex.

Samuel Frew, Sr., 65, who retired April 1 as assistant foreman at the Mid-Continent Petroleum Corp. refinery in Tulsa, died in Tulsa April 22.

J. R. Latimer, who was a drilling contractor active at Borger, Ranger, and Desdemona, Tex., recently died at Fort Worth. He was a partner in the firm of Devore & Latimer in the Panhandle in the 1920's.

Herbert H. Lewin, 77, who retired several years ago as vice president of Apex Petroleum Co., died April 23 in Long Beach. He founded several early-day oil companies following the Signal Hill discovery.

John Stone Stump, Jr., 72, who retired in 1943 as a director and vice president of Penola, Inc., died April 21 in Baltimore, Md. Since his retirement he had been a consultant to Wilson Carbon Co. His former positions include that of assistant in charge of gasoline sales and assistant manager for Standard Oil Co. of New Jersey in Baltimore, and manager of the wholesale department of Pennsylvania Lubricating Co.

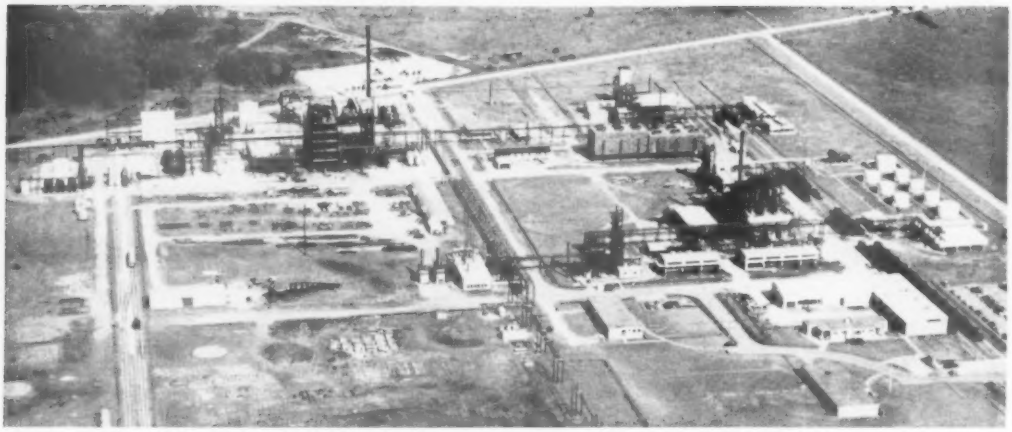
Oliver E. Killingsworth, 59, Osage, Okla., oil driller, died April 20 at Muskogee, Okla.

Harry D. Morrison, 74, retired drilling contractor, died April 26 in a Tulsa hospital. He established McCune & Morrison Drilling Co. in 1919 and was a partner in the firm until his retirement in 1943. He was a native of Ohio and worked for the old Jackson & Wise Drilling Co. at Sapulpa, Okla., before coming to Tulsa a year later.

William Davis McKinley, 58, retired refinery-construction superintendent, died April 28 of a heart attack in Tulsa. He had been associated with Western Supply Co., Tulsa.

Charles J. Barkdull, 66, retired executive vice president of Standard Oil Co. (Ind.), died April 20 in Miami, Fla.

Willis F. Roth, vice president of Standard Oil Co. of Kentucky, died April 24 at Sarasota, Fla.



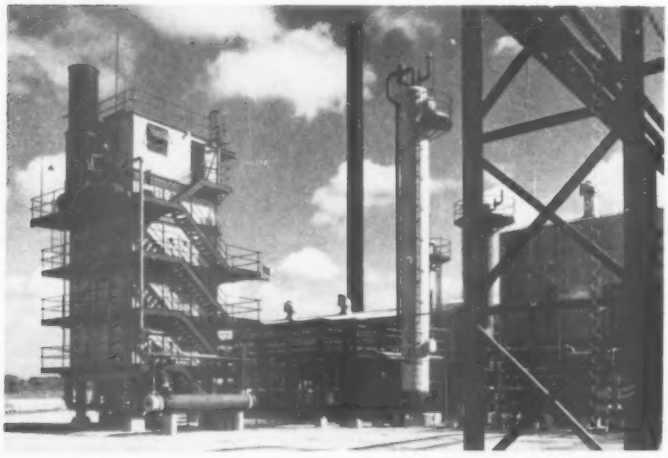
AERIAL VIEW of entire Rohm & Haas Co. plant at Houston.

PETROCHEM REPORT:

New $8,000,000 Plant in Houston to Make Acrylate

A continuous catalytic process reacting acetylene, carbon monoxide, and an alcohol results in a lower price, as well as a flexibility which permits its use in manufacturing acrylic esters of other alcohols.

by F. Lawrence Resen
Gulf Coast District Editor



CARBON MONOXIDE UNIT at Rohm & Haas Co. acrylate plant at Houston.

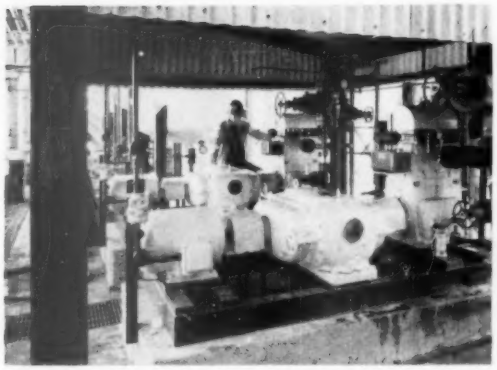
ROHM & HAAS CO. has completed an $8,000,000 installation at its Houston petrochemical plant for the manufacture of methyl and ethyl acrylate by an entirely new process.

A continuous catalytic process reacting acetylene, carbon monoxide, and an alcohol is employed by Rohm & Haas. An alternative method uses ethylene oxide and hydrogen cyanide as basic raw materials.

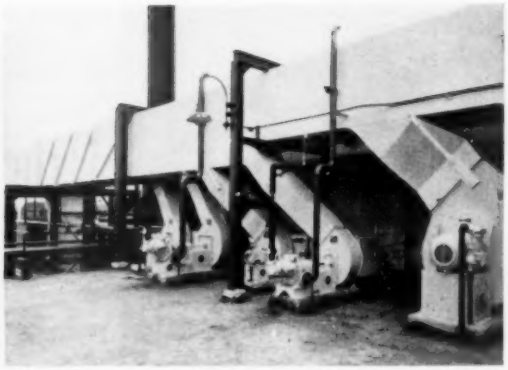
However, the new process is more economical, permitting a decrease of 6-7 cents per pound in the 48-49 cents per pound price of the monomers, according to Dr. D. S. Frederick, R. & H. vice president. Flexibility of the process makes the same reaction system suitable for use in manufacturing acrylic esters of other alcohols, such as n-butyl, ter-butyl, 2-ethylhexyl, n-octyl, allyl, and 2-ethoxyethyl. In addition, the same process can be used for the manufacture of glacial acrylic acid. For the present, however, methyl and ethyl acrylate will be the only two monomers produced with others to be made available as demand develops.

Reppe chemistry . . . Initial work on the process had been done by Dr. Walter Reppe, in Germany, who showed that esters of acrylic acid could be obtained from acetylene, carbon monoxide, and an alcohol, by either a stoichiometric process under mild conditions, or a catalytic process at high temperatures and pressures.

In the stoichiometric process, acetylene, alcohol, nickel carbonyl, and an acid such as hydrochloric react at atmospheric pressure and a temperature of about 40° C. to give approximately 60 per cent yields of acrylate. Under these conditions, the carbon monoxide



HIGH-PRESSURE FEED PUMPS for nickel carbonyl production at Rohm & Haas plant.



DUCTS leading contaminated air to furnace and stack of Rohm & Haas plant.

entering into the reaction is derived from the nickel carbonyl.

The theoretical representation as applied to preparation of ethyl acrylate is:

$$4C_2H_2 + 4C_2H_5OH + Ni(CO)_4 + 2HCl \rightarrow 4CH_2{=}CHCO_2C_2H_5 + H_2 + NiCl_2$$

In actual practice, however, little if any hydrogen is actually evolved. Instead it is taken up in secondary reactions which produce undesirable by-products. As much as 15 per cent of ethyl propionate may be formed in the stoichiometric process.

High-boiling impurities may be separated from the alkyl acrylate, but the propionate is very difficult to separate because of closeness in boiling points. For instance, there is less than 1° difference in boiling point between ethyl acrylate and ethyl propionate over the range from 50 to 760 mm. Another disadvantage in this process is the large amount of nickel chloride which must be recovered and reconverted to nickel carbonyl for recycling.

Catalytic process . . . In Reppe's experiments, these disadvantages led him to attempt the process catalytically. At temperatures of 150° to 180° C. and pressures of about 30 atm. it was found possible to convert acetylene, carbon monoxide, and an alcohol to acrylate in the presence of a catalyst such as nickel bromide.

Its disadvantages were:

1. Slowness . . . A considerable amount of recycle was necessary. At temperatures less than 150° C. the process was too slow to be practical.

2. Depletion of catalyst . . . At practical operating temperatures, the nickel carbonyl which is formed is partly swept out of the reaction mixture and is also rapidly decomposed since it boils under normal pressure at 43° C. with decomposition.

3. Temperature . . . At the high temperature required, the use of low-boiling alcohols is impractical, and the desired acrylate, while containing less propionate, is contaminated with organic halogen compounds.

4. Pressure . . . At the pressure required for the catalytic process, acetylene forms tars which contaminate the catalyst. The handling of acetylene at such a pressure is hazardous and special equipment and precautions are needed.

New development . . . Rohm & Haas came up with a process which avoids the disadvantages but still retains the advantages of the catalytic process. Basic features of the new process are:

1. Mild operating conditions are employed. High yields and conversions of acrylates are obtained which are readily purified and contains less than 2½ per cent propionate.

2. The process may be run as rapidly as the heat of reaction can be removed and the reaction time is so short that the size of the reactor is comparatively small.

3. Much smaller amounts of nickel must be recovered and recycled than in the stoichiometric process.

R. & H. Research Laboratories confirmed previous reports that a stoichiometric mixture of acetylene and carbon monoxide gas remains unchanged for an apparently indefinite time when passed through alcohol containing nickel carbonyl or nickel carbonyl-HCl at atmospheric pressure of 0°-75° C. temperatures, as explained by Dr. Ralph Connor, vice president in charge of research and development.

However, R. & H. research discovered the key to a workable process when it was found that if the stoichiometric reaction of the acetylene, alcohol, carbonyl, and acid were started, carbon monoxide gas could then be introduced to produce acrylate by combining with the acetylene and alcohol under mild conditions. This work was done under the direction of Dr. H. T. Neher. Thus, the catalytic reaction between acetylene, CO, and alcohol can be superimposed upon the stoichiometric reaction involving nickel carbonyl and HCl, with the latter reaction apparently producing the catalyst necessary for the process to function. (The carbonyl group in the acrylate produced is derived from both the carbon monoxide gas and the nickel carbonyl.)

Rohm & Haas process . . . The ratio of carbon monoxide gas to the carbon monoxide content of the nickel carbonyl may run from 20/80 to 85/15, although the preferred range is from 60/40 to 80/20. Other preferred conditions include a temperature of 30° to 50° C., an HCl/$Ni(CO)_4$ equivalent ratio of 1/1.01 to 1/1.2, acetylene-total CO ratio of 1.01/1 to 1.1/1, and an alcohol-total CO ratio of 1.1/1 to 3/1. Alcohol is usually a convenient solvent to improve the fluidity of the reaction mixture. The process is conducted at atmospheric pressure and is particularly suitable for continuous operation.

High yields, in the range of 80-90 per cent, based on acetylene and total carbon monoxide, are realized. There is practically no recycle other than excess alcohol. The crude acrylate contains only a small amount of propionate (less than 2.5 per cent) and is readily purified.

(Continued on page 122)

A. E. Chester, vice president and manager, production department, Magnolia Petroleum Co., author of this article, given at A.A.O.D.C. Safety Clinic, Dallas, April 9-10, 1953.

Mr. Drilling Contractor . . . Here's

What Oil Companies Want in SAFETY

. . . Are you delivering it?

by A. E. Chester

"FLYING RED HORSE"

Magnolia Petroleum Co. is one of the great drilling-producing companies of Texas and the Southwest. Many drilling contractors drill for Magnolia in areas like the Permian basin, and various spots otherwise south, north, and east in Texas, New Mexico, Kansas, Oklahoma, Arkansas, Louisiana, etc.

Shown here is Magnolia's general office headquarters at Dallas.

SAFETY does not just occur. Safety is obtained only when there is a conscious effort by men in the organization to have safety.

There is an old adage in safety work that safety must begin at the top level, and the desire to have safety throughout the entire operation must be in the minds of all persons, no matter what their jobs may be. This might be called safety consciousness.

It is not enough that each man on the team desires safety. Unless that man has an understanding of his job, of the job of the men who work near him, and unless he knows and understands his tools and what his part of the job is to be he cannot be a safe employe, either for himself or for his coworkers. Stated another way, an employe can be a safe employe only if he is a trained employe and works under proper supervision.

What the oil company really wants from the drilling contractor is good results in safety, and by good results is meant that the work to be done shall be performed without preventable loss. To accomplish this result the oil company wants the drilling contractor to conduct his operations in compliance with every recommended safety practice suitable for use under the circumstances.

Why the Oil Company's Interest?

Why is it of such concern to the oil company that the drilling contractor so

conduct his operations?

Some of you drilling contractors may feel that, since the relationship in law which is created by a drilling contract is usually sought to be that of an independent contractor and principal rather than an employer-employe relationship, and since most drilling contracts require the contractor to carry public liability, workmen's compensation, and other protective insurance for the benefit of the public and the oil company, the company should not be directly concerned with whether the contractor performs his work without accident or damage. Nothing could be further from the truth.

The complex economy under which we live and work and the use of service companies to dig pits, clear locations, cement pipe, run electrical logs, to mention only a few of the many services, result in a very complex legal relationship existing among the various interested persons at or around the drill site.

Our lawyers talk in terms of contractural indemnity, common-law indemnity, contribution, subrogation, and use other learned legal terms which you and I are not expected to understand and which we sometimes doubt that they do. Of this much they can convince us—that the risks and the legal liabilities incurred are sometimes illusory and certainly cannot be measured in any physical way.

While the incidence of liability is certainly an important feature of the drilling contract, and while the legal relationship of principal and independent contractor is that which is most often resorted to in fixing contract obligations, the relationship has come about through the influence of many laws and practical considerations. Various tax laws, social security laws, wage and hour laws, and the contracts and benefit plans which the operator has with its employes generally, all have influenced and helped to shape the form which a drilling contract now takes.

Our attorneys tell us that for all of these reasons it is important that the status created by the contract and by the acts of the parties under the contract remain that of independent contractor and principal. This relationship is most often determined by the courts on the basis of which of the parties has the right of control of the details of the performance of the work contracted for under the agreement and less often by which of the parties actually exercised control. For this very good reason the oil company cannot expect to force his drilling contractor to work with good safety practices by having a supervisor on the job to see that he does.

The company must rely upon the drilling contractor for the safety methods employed. Of course, if the opportunity to renew a contract presents itself the company may rely upon its past experience with its drilling contractor to determine whether the proper safety devices and practices have been used and, consequently, whether it wants to deal again with the same contractor.

First Point for Safety

First in order of importance to the oil company is the assurance that the contractor will so conduct his operations as to protect the life and limb of any person, whether he be simply a member of the public, a curious stranger, an employe of the contractor, an employe of the oil company, or an employe of one of the various service companies. The operators primary interest in this matter is not from the standpoint of dollars and cents. His interest is primarily humanitarian.

In my own experience, I have never reported to a superior authority in my company that we had suffered a blowout, fire, or some other serious catastrophe, without the first inquiry from that man being: "Was anybody hurt?" That is the way we feel about it. That is the way operators generally feel about it.

Drilling an oil well with the machinery and equipment which is in use today is a far cry from the operation as it was conducted 30 years ago, but the one thing which remains in common about the operation is the hazard to the employe or other person in working on or about a drilling well. Through bitter experience we have learned much about how to prevent accidents and how to minimize their effect, but, in spite of all we have learned, accidents still happen.

Each accident is accompanied by a distinct social loss, both to the person legally responsible and to the person who sustains the injury. Damages or workmen's compensation benefits are but a poor substitute for the loss of a hand or an arm, or the paralysis resulting from a broken back, and the death benefits payable to a widow or children are poor substitutes for the pay checks of the wage earner of the family.

The full tragedy of Bill Smith's broken back may not be fully realized until Bill, Junior, misses his promotion 30 years later because of the lack of an education, missed because of his father's accident.

This type of economic loss is not measured in dollars and is not charged against the man responsible and yet its effect is felt in our society. So I repeat to you that the first and paramount reason why the operator wants safety from his drilling contractor is to protect as much as possible the life and limb of any person who might be injured at or around the site of the drilling operation, regardless of whether that person is an employe of the contractor, an employe of the operator, or a member of the public generally.

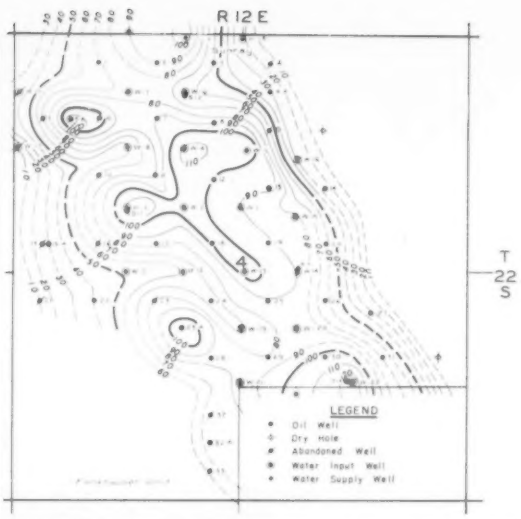
DRILLING AT PEGASUS . . . Productive horizons are Spraberry (Permian), 7,500 ft.; Wolfcamp (Permian), 9,800 ft.; Pennsylvanian, 10,100 ft.; Devonian, 11,700 ft.; Fusselman (Silurian), 11,800 ft.; Ellenburger (Ordovician), 12,500 ft.

Second Point for Safety

Second most important reason for safety demanded of a drilling contractor is to protect property which might be damaged. The property of which I speak may be divided into two major categories; first, that of property found upon the surface of the ground, and, second, that which is beneath the sur-

(Continued on page 127)

ISOPACH MAP of net permeable productive oil sand in Sunray's Fankhauser unit. (Fig. 1).



ISOPERM MAP of this Bartlesville sand pool shows average permeability for productive oil sand (Fig. 2).

OFFSHORE SANDBAR

Prolific Water Flood in East Kansas

By primary (23 years) . . . 3,960 bbl. per acre
By flooding (4 years) . . . 4,950 bbl. per acre

by J. D. Walters*

WATER-FLOOD operations covering only 4 years at Sunray Oil Corp.'s Fankhauser unit, a Bartlesville sand shoestring in Greenwood County, Kansas, has recovered to date an amount of oil almost equal to that obtained by primary methods over a preceding 23-year period.

Water injection started in February 1949. To the end of 1952, the monthly oil rate averaged 25,900 bbl. for the unit over the 4-year period. This compares with a monthly average of only 4,800 bbl. obtained during the primary period from 1926 to 1949. Today, the oil rate remains nine times what it would have been under continuation of primary conditions. Two oil wells have produced each more than 100,000 bbl. of oil.

Primary Development

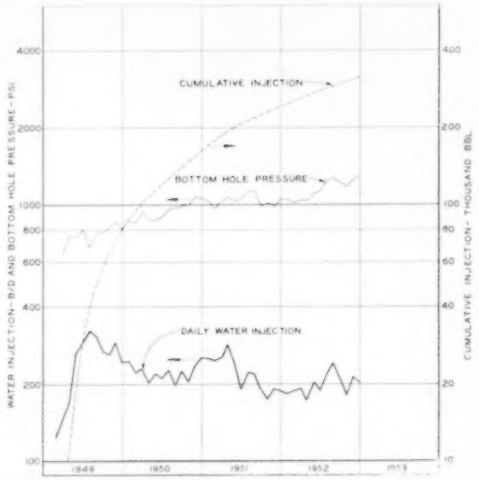
The property was developed initially in 1926 and 1927 with the drilling of 33 producing wells, 10 of which were plugged prior to water-flood development. The wells produce from the Bartlesville sand found at about 1,900 ft. Fankhauser field lies in the Lamont leg of the Sallyards-Lamont Bartlesville sand trend. Most of the producing wells were shot upon completion. Initial production ranged from 50 to 370 bbl. per day.

Primary production from an estimated 330 productive acres totaled 1,307,000 bbl. from date of initial production in 1926 to date of water injection in 1949. This represents an average of approximately 3,960 bbl. an acre. No secondary-recovery operations had been utilized prior to water-flood operations. Production statistics indicated a normal decline trend. The producing wells were making very little water at the time the water flood was put into operation.

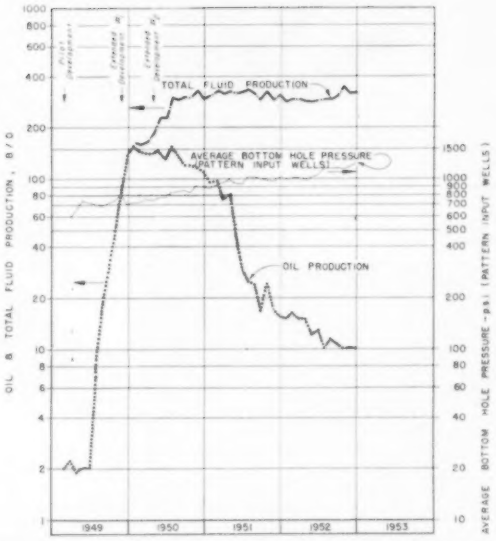
Reservoir data . . . Core analyses of rotary cores taken in all of the water-input wells drilled under the water-flood development program indicated an average porosity of 20 per cent for the Bartlesville sand. Net sand thickness for the flood project is 25 ft. Permeability to air of the net permeable sand sections averages 80 md. As the indicated core saturations were not considered to be representative of the reservoir, interstitial-water saturation was estimated to be 40 per cent of the pore volume. Produced oil gravity of the Bartlesville sand is 41° A.P.I.

While local shale partings and impermeable streaks are present in the cored sand, no major continuous zone could be correlated throughout the sand body. An isopach map of the net permeable productive oil sand is shown in Fig. 1. Net sand thickness of the area under flood varies from a minimum of less than 10 ft. to a maximum of 42 ft. in the flood area. An isoperm map, which shows the average permeability for the permeable productive oil sand, appears in Fig. 2.

*Author is petroleum engineer in charge of water-flood section, Sunray Oil Corp., Tulsa. Presented at the spring meeting of the A.P.I. district, Division of Production, Tulsa, March 18-20, 1953.



PERFORMANCE CURVE for Well W-2 shows only slow drop in daily input rate with time; and steady increase in bottom-hole pressure (Fig. 3).



SHARP JUMP in oil output from 2 to 150 bbl. per day for Well "A," a pattern five-spot oil well in pilot area (Fig. 4).

Average well permeability ranges from 11 md. to a maximum of 127 md.

Water-Flood Development

Flood patterns on 10 and 20-acre spacing were studied, but it was decided that a 10-acre five-spot pattern was the most feasible one from recovery and economic standpoints. Most of the old producers were utilized as pattern-producing wells, inasmuch as original primary development was on 10-acre spacing.

The flood pattern was planned so that very few input wells would be located on the outside of the structure area for economic reasons. Moreover, it was believed that a higher flood efficiency could be obtained by using outside-pattern well as producers.

Drilling of nine water-input wells and two water-supply wells for a 75-acre pilot-flood installation was commenced in November 1948. This work took place after unitization of royalty interests under four leases comprising 574 leased acres.

Water injection in the nine input-well pilot flood was commenced on February 10, 1949. The indicated success of pilot operations resulted in various phases of extension development. This phase, commenced in August 1949 and completed in December 1950, resulted in the drilling of 13 additional water-input wells, 5 oil wells, and 2 water-supply wells. This accounted for a total of 22 Sunray-operated water-injection wells, 4 water-supply wells, and 27 oil wells. An estimated 246 acres was developed for water-flood operations.

Completion practices . . . All water-injection wells were drilled with rotary tools and cased with 4½-in. o.d. casing set in the top of the oil-sand section and cemented with about 75 sacks of cement. Cable tools were used to drill the cement plug, and to clean the sand face; another application was for plug-back operations where shale sections were cut below the sand body. All water-input wells were cored and analyzed. None of the input wells were shot as it was believed that this practice would not improve flood efficiency.

New oil wells . . . Five oil wells drilled under the water-flood program were completed in a similar manner, except that they were cased with 5½-in. o.d. casing; four of these wells were shot very lightly. Most of the old producing wells utilized in the flood pattern had been shot upon initial completion. Reconditioning of old oil wells was considered necessary; however, this operation was limited to running a sand pump.

Water supply . . . Supply water for the initial pilot-flood operations was obtained from four 800-ft. supply wells completed in the Douglas sand; this is a salt-water-bearing formation, 100 ft. thick, commonly called the "Big Waters" sand. Analysis of the supply water indicated that plugging action would not result on injection into the Bartlesville sand on mixing of the two waters.

At the end of 1952, only three of the supply wells were utilized; the fourth was saved as a standby. It was found that produced water was being returned in a quantity sufficient to meet water-injection requirements (in addition to that produced from three supply wells).

Water-supply wells are equipped with 4½-in. tubing and 3¼-in.-bore insert pumps. Pumping units are driven by 30-hp. electric motors capable of handling 1,200 bbl. per day.

Each oil well is tested at least once a month. This practice was employed more frequently when the production rate of the wells increased during the reservoir fillup and peak-production periods. These tests formed the basis for estimating monthly and cumulative oil and water production thus giving basic data for records kept on each well. Main gathering lines are paralleled by test lines, with connections to headers, which facilitate the testing of individual wells directly into stock tanks.

Water-injection systems . . . During the period of pilot operations, water was pumped directly from the supply wells into the injection wells. A water processing plant was installed when the oil wells began to produce increasing amounts of fluid and when higher-injection pressures became necessary.

Return water is collected from free-water knockouts and treaters in a 750-bbl. receiving tank, then pumped through two 8-ft. by 10-ft. pressure-type sand filters into a 1,500-bbl. clear-

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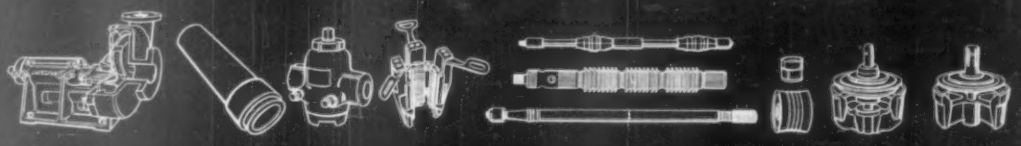
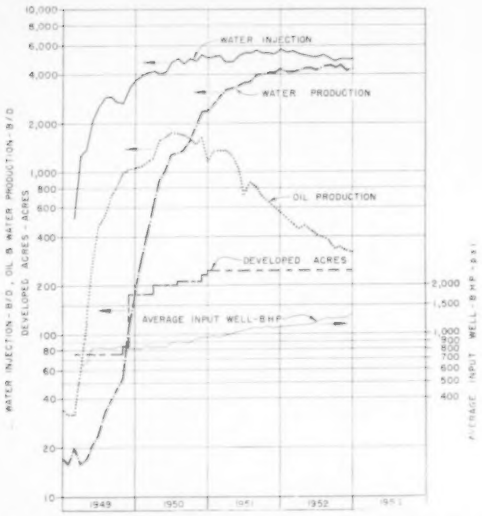
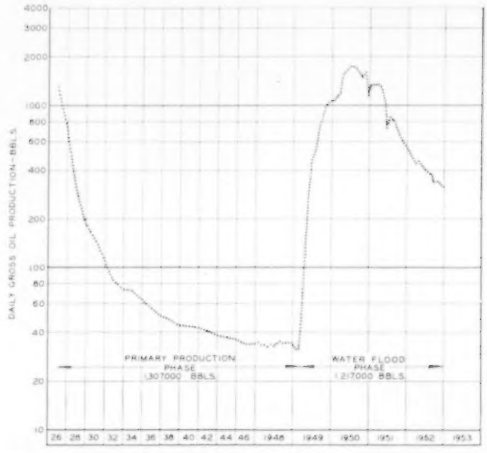




WATER-FLOODING PERFORMANCE shows trends in oil production, reservoir pressure, water injection, water production and acreage (Fig. 5).



OIL RECOVERY in past 4 years nearly equals total primary production for Fankhauser unit (Fig. 6).

water storage tank, where it is mixed with Douglas sand supply water that is pumped directly into the tank. A gas seal is kept on top of the tanks, as well as a layer of oil on top of the water, to exclude air and thereby form a closed system.

Two horizontal triplex pumps, driven by 60-hp. electric motors, pump water from the clear-water storage tank into the injection system. As of January 1, 1953, the plant was delivering approximately 7,200 bbl. per day at 700 psi.; of this total 2,200 bbl. were delivered to other water-flood projects in the field.

Two water-injection manifolds equipped with gate valves, meters, and pressure gages for each input well, and located at separate points on the project, facilitate readily regulation of the input rates and reading of daily and monthly injection volumes for each input well. Individual 2-in. cement-lined pipe lines connect the manifolds with input wells, while lines from the plant to the manifolds are 4-in. cement-lined pipe.

To maintain predetermined operating levels in the clear-water storage tank, control equipment is provided for automatically starting and stopping each water-supply well when selected levels are reached in the storage tank. In addition, other automatic devices make the plant self-protecting as well as permitting unattended operation, except for lubricating pumps and backwashing of filters.

During periods of plant shutdown for repairs, injection can be continued, but at a lesser rate, by pumping water directly from the supply wells into the injection system.

Production equipment . . . Prior to water-flood development, the oil wells were pumped by Oklahoma-type rod-line jacks operating off the central powers. Where pilot water-flood operations were successful, individual pumping units were placed on the oil wells. These units were driven either by 7½-hp. or 10-hp. electric motors (depending upon the load) and were equipped with time-clock controls.

Water-Injection Performance

Initially, most of the input wells took the desired amount of water on vacuum and later went on pressure. Injection practice called for using about 2 bbl. per day of water per foot of sand. This rate was increased gradually over a 2-month period to the maximum desired input. During this period, particular care was taken not to cause channeling or breakthrough. At the end of 1952, all wells required use of well-head pressure; pressures employed ranged from 270 to 625 psi.

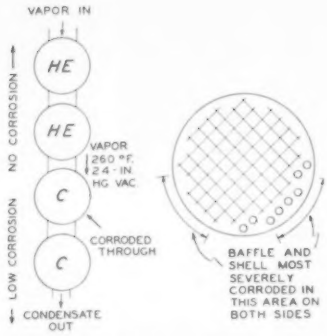
Where input wells would not take the desired rate, they have been successfully acidized in a few instances. In several cases, pressures dropped considerably after merely pumping injection water into wells for a short period at a slightly higher pressure.

Performance curve for Well W-2, one of the original pilot-flood water-input wells, is shown in Fig. 3. As

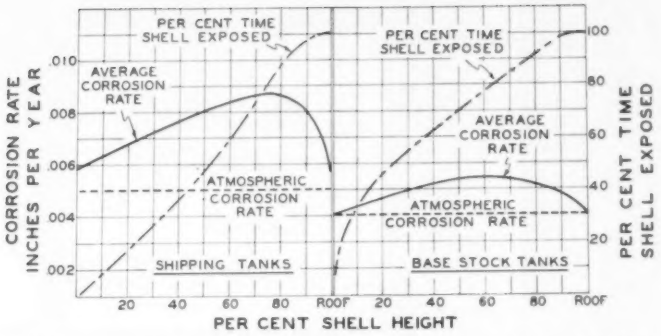
(Continued on page 125)

TABLE I—FANKHAUSER UNIT WATER-FLOOD OVER-ALL PERFORMANCE—PRIMARY PHASE VS. FLOOD PHASE

	Primary operations (1926-1949)	Water-flood operations (1949-1953)
Number of acres developed	330	246
Number of oil wells	33	27
Number of water-input wells		22
Cumulative oil production	1,307,000	1,217,000
Cumulative water production		3,358,000
Cumulative water injection		6,177,000
Cumulative oil production per oil well	39,700	45,000
Cumulative water production per oil well		124,200
Cumulative water injection per input well		281,000
Cumulative oil production per acre	3,960	4,950
Cumulative water production per acre		13,600
Cumulative water injection per acre		25,100
Cumulative produced water-oil ratio		2.75
Cumulative injected water-oil ratio		5.07
Daily produced water-oil ratio (2-10-49)	0.65	
Daily produced water-oil ratio (1-1-53)		13.4
Daily injected water-oil ratio (1-1-53)		15.2



NAPHTHENIC-ACID corrosion is typified here. This material is especially corrosive at its boiling point. Fig. 1.



GASOLINE-TANK corrosion rates are highest at 60 to 80 per cent of the shell height. Corrosion takes place almost constantly just under the liquid level, the rate depending on concentrations of water and oxygen. Fig. 2.

Here's what's happening in

Mitigating Corrosion in Processing Equipment

As Reported by

by Gerald L. Farrar
Engineering Editor

This report to Journal readers is a resume compiled from technical papers, informal discussions, and symposiums presented at the recent annual meeting of the National Association of Corrosion Engineers in Chicago.

Technical papers from which some of the information is drawn are: "Inspection of Petroleum-Refinery Equipment," by E. H. Tandy, Standard Oil Co. of California; and "Cathodic Protection of Heat-Transfer Equipment," by R. W. Stetson and Burke Douglas, Dow Chemical Co.

SMALL changes in plant operating conditions will often result in excessively high corrosion rates. The plant inspection personnel must be especially aware of these changes and make every effort to determine their effects on corrosion rates.

An inspection program is necessary for tanks used in storage of petroleum products. While corrosion rates are lower than for process equipment, major repairs are often necessary within 10 years after installation.

Inspection program . . . An equipment-inspection section has been set up as part of the refinery-engineering division at the El Segundo refinery of Standard Oil Co. of California. Its function is to make inspections at the proper intervals, to record and analyze corrosion data, to keep a record of the life and service history of the equipment, and to compile data on the materials used for construction and repair.

The inspector must have a fundamental knowledge of the chemistry of the process and the operating conditions of the various plants. He must have an intimate knowledge of the individual pieces of equipment, and needs to understand the chemistry of corrosion. He must also have an understanding of practical metallurgy.

Observed corrosion rates . . . Corrosion rate is calculated from gage measurements of established gage points, or from actual thickness measurements at each inspection. Since the apparent corrosion rate for any one period is an average for the conditions during the last run, a careful check must be maintained on the results for each run and for the over-all operating life.

A small operating change can cause a substantial change in corrosion rates. Equipment changes in a combination crude-distillation unit enabled a feed-rate increase of 20 per cent. Corrosion during the next run of 6 months increased noticeably, but was not severe.

For the next run, feed rate was increased 1 per cent by increasing outlet temperature of the atmospheric furnace 10° F. At the end of the run the 5 per cent Cr-Mo tubes in one part of the furnace were corroded to minimum thickness throughout their entire length. Previously the tubes had suffered pitting and cavitation at the inlet ends, easily protected by installing short sleeves. The new corrosion rate (about 0.020 in. per 1,000 hours) was so high that the tubes were replaced by 18-8 Cr-Ni tubes.

Hydrogen-sulfide corrosion . . . Corrosivity of hydrogen sulfide on carbon and low-alloy steels increases rapidly above 500° F., reaching a maximum at about 900° F. Corrosion rate on carbon steel is about 0.002 in. per 1,000 hours at 500° F., and about 0.250 in. per 1,000 hours at 900° F. When operating conditions are known, rate can be predicted fairly accurately; changes in these conditions must be compensated for at once.

The feed for one of the thermal reformers contains sulfur compounds that break down to form hydrogen sulfide on heating. Under the existing operating conditions, the corrosion rate of 1¼ per cent Cr-Mo tubes in the wall coil was 0.006 to 0.008 in. per 1,000 hours. Eccentricity factor was 60 per cent, meaning that 60 per cent of the total increase in inside diameter was caused by corrosion on the hot side. Estimated life after one inspection was about 6 years.

Routine inspection 1 year later showed 14 tubes to be corroding at a rate far greater than anticipated. Corrosion rate was 0.025 in. per 1,000

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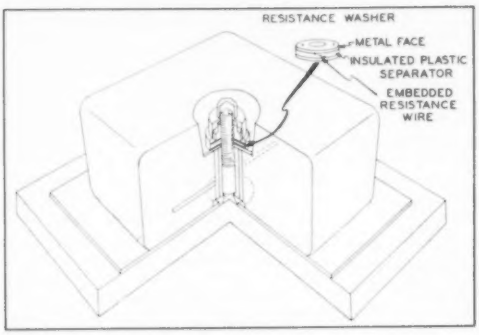
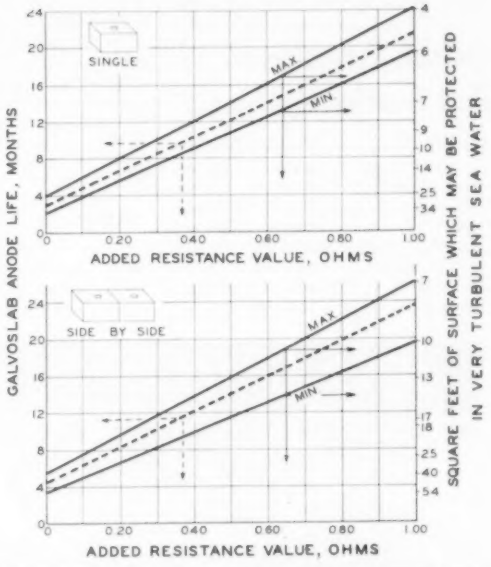


STANDARD ANODE and resistor washer are used by Dow in cathodic protection of heat-exchange equipment. Fig. 3.



DESIGN DATA for cathodic protection of heat-exchange equipment using magnesium anodes. Turbulent sea water is the coolant. Fig. 4.

hours, and eccentricity factor was 72 per cent. The area of accelerated corrosion was a circle about 12 ft. in diameter near one end of the furnace. Outside this circle conditions were normal.

Examination revealed that one of the burners was cocked and poorly adjusted, resulting in flame impingement on the tubes in the corroded area. Localized high temperatures and consequent accelerated corrosion were caused by the overheated tubes.

Naphthenic-acid corrosion . . . Naphthenic acids, present in some crudes or formed during processing, cause considerable trouble. Their boiling points are in the same range as many crude fractions, and they are often concentrated, causing severe corrosion. Equipment must be inspected carefully, since it is difficult to predict where corrosion will occur. No scale is formed.

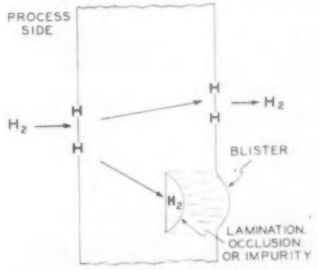
The corroded surface of carbon steel and cast iron is smooth, and gage measurements are required to determine corrosion. Low-chrome steels are severely pitted, at rates higher than carbon steel. High-alloy steels are usually not affected. The acids are most corrosive on condensation, rates as high as 0.040 in. per 1,000 hours having been determined on carbon steel. Rates drop rapidly below the boiling point, and there is negligible corrosion in the vapor state.

An example of typical naphthenic acid corrosion is shown in Fig. 1. Vacuum overhead from a crude-distillation unit passes through two exchangers and two condensers in series. After operating little more than 1 year, the lower part of the shell on the top condenser was corroded through, the indicated corrosion rate being 0.020 in. per 1,000 hours. No corrosion was noted in the exchangers and very little was noted in the bottom condenser.

The condensate at its boiling point dripped off the tubes and onto the lower part of the shell, thus causing the corrosion. The condensate was some 15° F. below its boiling point in the lower condenser, and resulting corrosion was very low.

Corrosion was halted by installing a vapor stop in the top of the bundle to prevent bypassing, and by installing Type 316 Cr-Ni-Mo shrouds on the lower part of the bundle to prevent drips on the shell. Condensate thus is directed to the bundle in the lower condenser where it is quickly cooled.

Corrosion in gasoline tanks . . . Corrosion rates in gasoline storage tanks are low as compared to rates encountered in process equipment, but are still high enough to cause major repairs after some 10 years of service.



HYDROGEN BLISTERING may occur whenever steel has laminations, inclusions, or impurities in the grain. Fig. 5.

The shells are difficult to inspect because of the area involved and because they are covered with a thick layer of rust. Thus it is necessary to have a gaging program for shell and roof of all such tanks. This is made doubly necessary because the standard A.P.I. tank design provides very low corrosion allowance in the areas of highest corrosion.

If corrosion rates for each course of tanks in similar service are averaged and then correlated with shell height, data such as those in Fig. 2 are obtained. Rate for the shipping tanks is about twice that for the base stock tanks. Shipping tanks are filled and emptied more often than the base stock tanks.

Corrosion takes place almost constantly under the liquid level. The rate depends on the quantity of water and oxygen absorbed into the stock. Corrosion on the roof and exposed portions of the shell which proceed at the atmospheric rate occur only while the shell is wet with condensed moisture.

Original joint efficiency should be used to calculate the strength of the joint in service in the tank. The strength of the joint should be also calculated for the net section of the plate at the bottom of the groove, using a joint efficiency of 100 per cent. The lesser of

the two strengths calculated should be used to determine the safe filling height of the tank.

Cathodic Protection of Heat-Transfer Equipment

CATHODIC protection for heat exchangers and condensers using sea water as cooling medium is economically sound, since savings of greater than $5.00 result for every $1.00 expenditure. More than a quarter of a million dollars is saved annually at the Freeport, Tex., plant of Dow Chemical Co. as the result of a cathodic-protection program.

Accelerated corrosion . . . All of Dow's heat exchangers and condensers are subject to either severe pitting of steel, selective galvanic corrosion of various materials of construction, graphitization of cast iron, or combinations of these attacks. This situation results from a combination of the factors, low electrolyte resistivity, high water velocity, comparatively high water temperature, and turbulence of the water.

In early attempts to stop corrosion of the steel and cast-iron heads, coatings were applied to these members. However, once coatings were applied, the mild cathodic protection normally afforded by the ferrous materials was no longer available to nonferrous members. As a result, dezincification of tube-sheet alloys and impingement attack on tube ends were soon observed.

In addition, most of the coatings had holidays, either as a result of insufficient number of coats or more commonly as a result of damage to the coating caused by small particles of shell carried in the seawater. As a result, the exposed small anodic areas suffered severe pitting attacks when there was a large cathode present.

Engineering Design

Tentative current requirements for cathodic protection of the heat-exchange equipment were found to be in the range of 50 to 125 ma. per sq. ft., depending upon the water velocity. Low resistivity of the sea water allows almost any practical magnesium anode shape or size to produce between 3 to 5 amp. in this service. This is more than ample current for protecting the normally small areas involved.

The most successful anode installations were found to be where the anode was bolted tight against the surface to be protected. This type of installation has a high inherent strength. However, this is dependent upon the quality of the bond between the magnesium anode and the anode core.

Not one case was found where magnesium anodes properly installed did not reduce the corrosion to an insignificant amount for the life of the anode. This does not apply to corrosion inside tubes as a result of foreign matter lodged in the tubes.

The use of coatings in conjunction with cathodic protection was found to be desirable from the standpoint of increasing the anode life where care was taken to insure anode replacement at suitable intervals.

Some of these coatings failed when used with cathodic protection. These failures were of the conventional blister pattern. In some cases the coating failures did not alarm production since the units were still obtaining protection from the anodes. However, some of these coatings came off in large strips and plugged some of the tube ends.

Increasing anode life . . . The short anode life was found to be the only weakness of the system. The use of a coating to prolong anode life, although beneficial, was not considered reliable because of the serious corrosion attacks that occur at the holidays in the coating unless the anodes are replaced on time.

The method selected for increasing anode life was that of increasing the

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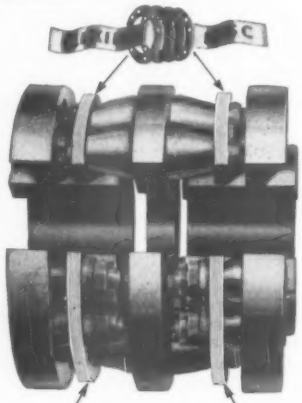

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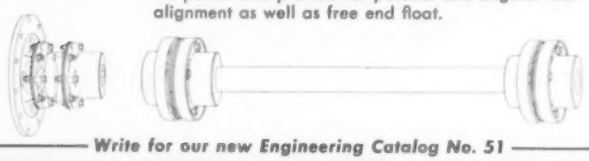

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anode to cathode circuit resistance, since the area to be protected in most heat exchangers is small and does not require the maximum current output of the anode to achieve protection.

A ¼-ohm additional circuit resistance was selected for use in the anode circuit, since anode life is sufficiently prolonged and anode efficiency is not appreciably decreased.

In order to insert the additional resistance into the electrical circuit of the bolt-on anode and not mechanically weaken the installation, it was decided to make the resistor in the form of a washer. By properly insulating the magnesium anode, all current delivered by the anode is forced to flow across this resistor washer. These washers can be used for several different anode installations before discarding.

Standard system . . . The anode selected to be the plant standard for cathodic protection of heat exchangers and condensers is very compact as shown in Fig. 3. This shape was selected because it is small enough to fit in most heat exchangers either as a single anode or as a unit of an anode system consisting of several identical anodes. The single unit weighs 15 lb.

Most effective insurance against anode core failures was found to be the welding of a cross member to the anode core. This anode has been found to be very satisfactory for service in high-velocity and turbulent sea water.

The anode and resistor washer are attached to the surface to be protected by a bolt as indicated in Fig. 3. This figure also indicates the manner in which the magnesium anode is insulated away from the surface to be protected by a rubber gasket and sleeve arrangement. The plastic cap seen in this figure serves to increase anode life by preventing the galvanic action between the anode and the stud bolt.

Design data for the anode system are shown in Fig. 4.

Anodes have been installed in approximately 350 heat exchangers or condensers varying in size from 1 to 14 ft. in diameter. In a few of the installations there was not sufficient room for the condenser anode, and other types have been used.

Economics of protection . . . Economics of the protection program show savings of more than $5.00 on every $1.00 invested, considering only the corrosion costs for steel and cast-iron head replacement. If the factors of tube and tube-sheet damage, lost product, lower operating efficiency, safety hazards, and the cost of the power lost as a result of turbine condenser failures are considered, even greater savings accrue.

Head and tubing corrosion costs of approximately $12,500 per year have been eliminated by the use of less than $200 worth of cathodic protection per year. Total corrosion costs have been reduced by more than $250,000 per year.

. . . Other Problems

Hydrogen blistering . . . Whenever steel has laminations, inclusions, or impurities in the grain, there is danger of hydrogen blistering. (See Fig. 5.) It has been found that up to 20 per cent of all steel has at least one of these defects.

Hydrogen blistering has been reported to have occurred on carbon steel gathering pipes in catalytic reforming units. Conditions of operation were 900° F. and 900 psi.

One school of thought is that hydrogen blistering does not occur above 300° F.; rather, the blistering action is caused by other gases formed when hydrogen reacts with carbon, phosphorus,

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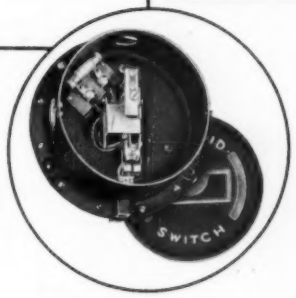

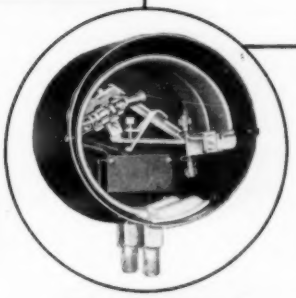

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Ranges to cover most applications (inches of water) 6" vacuum to 6" pressure, and 30" vacuum to 30" pressure. Available for various circuit arrangements.

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FOR HIGH PRESSURES

Mercoid Type BB Differential Pressure Controls open or close a switch contact according to a change in the difference between two pressures.

Type BB employs two Bourdon tubes, each responsive to a pressure condition to operate a Mercoid Magnet operated mercury switch as the difference in pressure between them increases or decreases. Available in ranges 60 p.s.i. to 2,500 p.s.i.

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and other materials present in the steel. At low temperatures, corrosion by hydrogen is evidenced by cracking of hard materials. At intermediate temperatures (below 300° F.) true hydrogen blistering occurs.

Corrosion in gas streams . . . When crude-oil feed to a primary distillation unit contains appreciable salt, corrosion in the overhead lines from the column usually is severe unless mitigating steps are taken. This corrosion is due to HCl formed by decomposition of the salt during distillation.

Mitigation has been reported to be 98 per cent effective when using ammonia injection, plus an organic inhibitor. The pH should be controlled by ammonia addition to the range 7.5 to 9 for greatest effectiveness. If pH is below 7.5, part of the neutralization occurring during the limited ammonia injection will be by corrosion. The inhibitor seems to be ineffective below this value.

Amount of inhibitor required for maximum effectiveness varies between 1 and 2 qt. per 1,000 bbl. of overhead from the column.

Recorders and controllers for pH seem to work reasonably well in this application if oil is kept off the glass electrodes. However, some report difficulty in obtaining satisfactory operations of these instruments in the presence of inhibitors.

Little or no difficulty has been experienced by the various operators due to depositing of ammonium chloride since the start of the inhibiting program.

Steam-condensate corrosion has been checked by one operator by injecting ammonia into the dry steam at the boiler house. Corrosion is almost completely halted if pH is maintained around 7.5. Ratio of ammonia to carbon dioxide for this pH value is about 1.5.

If pH goes too high, especially rapid corrosion of copper-alloy tubes occurs. This may sometimes be confirmed visually by noting the color of the condensate. The appearance of a blue color confirms formation of the copper-ammonium complex.

Applied coatings . . . Sprayed metallic coatings may be successfully applied to carbon steel if the metal used is less noble than steel. Aluminum and zinc are the metals most commonly used. Zinc is especially successful in the presence of water with low chloride content. Aluminum is used for wet hydrogen sulfide service.

Porcelain enamels are in general limited to specialty items, such as petrochemicals manufacture, where highly corrosive agents are used, or where product contamination is serious.

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You are invited to see the JOHN ZINK display of burners for Refineries, Natural Gasoline Plants and Power Boilers.

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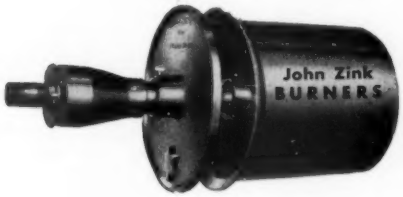

John Zink and his engineers manufacture more than FIFTY TYPES of gas burners, oil burners and combination burners for domestic boilers, heating boilers, industrial boilers and power boilers; also Field Flare Burners, Air Heaters, Floor Furnaces, Central Heaters, Wall Heaters and Conversion Burners. The designs are protected by TWENTY United States Letters of Patent.

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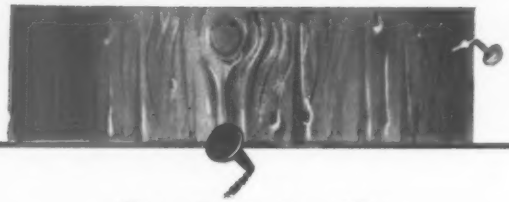

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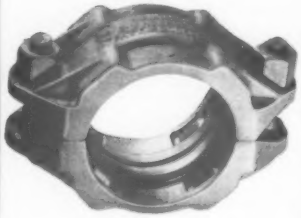

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Disadvantages of use are cost and fragility of the linings.

Advantage of the porcelain enamels lies in the almost complete absence of corrosion when they are used. Small breaks in the enamel can be easily repaired with cement and tantalum plugs. The larger breaks can also be repaired satisfactorily and economically.

Porcelain coatings have in some instances proved economical for use on bubble caps on the top trays of crude distillation towers. Other operators, however, report success in the use of coated bubble caps.

Sulfuric acid leaks . . . Best practice in handling sulfuric acid leaks is to control them at the source. The leaking acid usually come from a pump gland, and is diluted before it exits from the equipment. Proper attention to guards and drainage can prevent leakage to areas where it cannot be easily controlled.

Vinyl chloride-base-type coatings can be used for floors and equipment coming into contact with sulfuric acid, provided acid concentration is less than 70 per cent. Multiple coats of more than two formulations must be used to get satisfactory thicknesses.

Silico fluorides are also used to treat concrete to increase resistance to attack by acids and alkalis. This treatment is economical, and application is simple.

Plastic tape . . . Plastic tape can be adapted for protecting small nozzles and nipples on towers operating below 212° F. For larger fittings, or where conditions are comparatively severe, a coating of asphalt or coal-tar enamel below the tape is recommended.

The tape has been used with outstanding success on overhead electric conduit and small piping. It has lasted over 3 years in areas where unprotected paints last 4 to 5 months. When protecting steel pipe, an inhibited primer should be used before the tape is applied.

BOOK

THE MOON IS OUR LANTERN. By Edward Tatum Wallace. Published by Doubleday & Co., Inc., 575 Madison Avenue, New York. 315 pp. $3.75.

A former Oklahoma newspaperman and telegrapher for a pipe-line firm has written a novel which deals with the life of an Oklahoma oil-line station and the men and women who live in it. Robert Farrow's life was inextricably involved with the simple ways of the small community, Council Meadows. One of the pumping stations of the Paragon Oil Co. line, it kept the heavy streams of oil slowly moving through the pipes from Texas to the Great Lakes. Robert had grown up there; he had left college to take over his late father's job as telegrapher. Romance comes, and the novel is the story of this romance in the face of bitter opposition.

How Sohio Trains Its Exploration Personnel

by M. W. Sherwin*

Trainee program extends through 12 months and is divided into four phases: 1. Seismograph field party. 2. Gravity field party. 3. Structural geology. 4. Operational geology. End result is broad thinking and understanding that will be demanded later.

A COMPREHENSIVE training program, initiated by Sohio Petroleum Co. nearly 2 years ago for its new exploration personnel, has developed the company's own answer to an industry problem. The answer seems so certain now to Sohio executives that plans are being made to introduce some of the older exploration personnel into a comparable, but possibly shortened program; these older personnel will be given the same advantages by training in the allied fields in which they may require broadening.

Why the Program?

When an opening occurred in either the geological or the geophysical departments, a young man of proper schooling was hired. He was usually fresh from the classroom and well indoctrinated in the theoretical rudiments of these branches. Normally, this young man would be good in theory, but weak in practice. His scholastic background would be broad, but it alone would be insufficient to enable him to cope with the varied daily applications presented.

The standard method of correction for this deficiency was to place the neophyte in the simplest, most scrutinized tasks of the district office or field party to which he was attached. Here his work was laid out. Sufficient supervision was available to preclude the possibility of his wandering too far astray either in his work or in his thinking.

Deficiencies revealed . . . This system was workable and reasonably practical. It gave men training, exposure to the work being done. At the same time, however, it revealed two glaring deficiencies. The first of these revolved about the fact that men employed as geologists and geophysicists, since they were hired for specific posts, started and continued their training in their special fields. In their early and formative years they gained no basic practical knowledge of the allied profession upon which much of their work of later years would be dependent.

A second fault, more peculiar to geological work than to geophysical, stemmed from the fact that district offices varied widely in their local activity. In one area, for example, there might be no active drilling program. A new man might easily spend a year or more working on maps, correlating subsurface data, yet gain no experience in the drilling operations that are the final tool of exploration. At the same time, in another district carrying on an intensive drilling campaign the situation might be reversed. The new employe might spend his entire time "well sitting," examining formation samples, coring and logging test wells.

Analyzing these circumstances, three things became evident:

1. We were not encouraging in our basic training the broad thinking and understanding that we would demand later.

2. New men, after their first year of effort, were unbalanced in experience through no fault of their own.

3. The first payroll year of such new employes was essentially a subsidy of Sohio. Although a new man might contribute a substantial amount of productive effort, he consumed a tremendous amount of time that supervisors could have spent on other urgent tasks.

Program Established

Recognition of these facts led to an obvious decision on the part of Sohio management. One executive put it in these words:

"Let us take the salary investment for these individuals in their first year and subsidize a training program. In that way we can assure ourselves that the men will get training they need, training we want them to have, a balanced indoctrination into our field of effort."

Putting this thinking into practice was the task of Walter Johnson, staff geologist, Lewistown, Mont. He worked out the details, and the "Sohio Exploration Trainee Program" was born.

As set up, all candidates for the program must be graduates of accredited schools. Scholastic standing, character, personality, and attitude as well as breadth of schooling are considered. Prospective candidates are directed to committee attention by geological and geophysical supervisors. They are also selected by visits to various outstanding colleges and universities.

Candidates are reviewed not fewer than four times during the year by a committee of five—the manager of exploration, two geologists, and two geophysicists. Unanimous approval of the committee is necessary for the selection of a trainee.

The trainee program extends through 12 months and is divided into four phases:

Seismograph Field Party—all operations (4 months);

Gravity Field Party—all phases of operations (2 months);

Structural Geology—includes subsurface mapping, field studies, surface geology and allied work (3 months); and

Operational Geology—includes well-sitting, well-sample examinations, coring, logging, etc. (3 months).

In the case of geophysical trainees,

*Chief geologist, land and exploration, production department, Sohio Petroleum Co., Houston.

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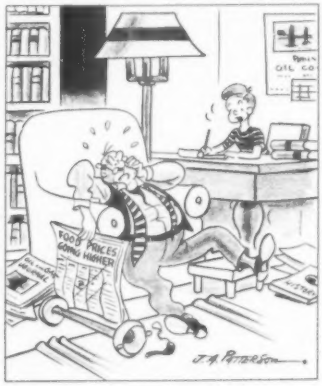
Basic orientation . . . The first few months of the course are considered as basic orientation. They cover the transition from purely academic to commercial effort. Beyond this, contact is kept with the individual through progress reports. The directing supervisor furnishes a memorandum at the conclusion of each phase. If progress is unsatisfactory, the trainee can be dropped at any time upon the recommendation of the committee.

On completion of each phase the trainee prepares a brief report covering his experience. This is a gage of the knowledge which he acquires. Constructive criticism of the course is encouraged. With the course completed the trainee becomes a full-fledged junior geologist, or geophysical computer. Assignments are decided by the committee.

Sohio's training program was started in July 1951. At the present writing six men have completed the program and have been placed in the line organization. Seven men are now in training. Others are being considered at this time for enrollment in the program.

The first candidates of the Sohio program were "guinea pigs," in that their experience and performance tested the validity of the approaches tried. A first year's review saw no major changes in program orientation, which is a tribute to the original planning of Walter Johnson. Minor adjustments have been made and will continue to be introduced as long as the need develops. These adjustments have been pointed toward the goal of efficient, practical, yet flexible training.



"If a loaf of bread costs 75 cents—a pound of butter, $1.36—a gallon of gas, 97 cents—a quart of oil, $1.34—oh, snap out of it, Pop, it's only for arithmetic class!"

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Control System Designed to Avoid Contamination of Gas Stream

by R. B. Tuttle
Associate Editor

System operates to regulate speed of compressors in proportion to pressure on sweet-gas gathering system

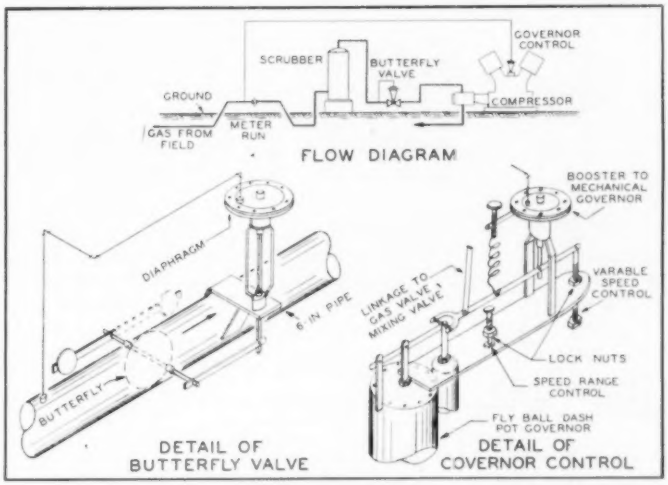
OPERATIONS at Arkansas Fuel Oil Co.'s Columbia plant near Magnolia, Ark., involve processing two different natural-gas streams. Both streams are run to the natural-gasoline plant, through separate field gathering systems, from dually completed wells.

Gas production from one zone in Magnolia field is sweet and production from the other zone is sour. Desulfurization is carried out at the plant. Following this operation, both streams are run to absorption in a single line.

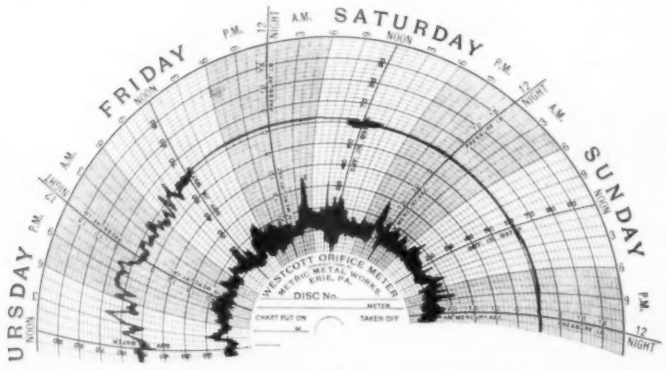
This stream mixture is not corrosive to plant equipment, since it is suitably free of H_2S. However, the sweet-gas stream has been occasionally contaminated with raw sour gas because of leaks around the well packers brought about by changes in pressure differentials between the two formations in the well. Field producing conditions do not permit maintenance of given pressures on the sweet-gas gathering system by usual methods because of variations in gas volumes.

Corrosion avoided . . . To avoid air contamination of the sweet-gas stream, which would cause a high rate of corrosion in contact with H_2S, T. O. Hamaker, superintendent at Columbia, devised a control system which has proved highly satisfactory. The accompanying reproduction of a chart, from one of the meters at Columbia, shows that the control system maintains a uniform pressure (0 psig.) on the sweet-gas system and thus air contamination is avoided.

Hamaker's control system operates to regulate speed of the plant's compressors in proportion to pressure on the sweet-gas gathering system. Originally, these compressors were driven at a constant speed, sufficient to take care of maximum load. Since the compressor drivers were governor controlled, the set speed was maintained regardless of field-gas volumes. When the field load fell off, vacuum would result in the gathering system. With the lowered pressure on the gathering system, leaks occurred at separators, motor valves, and fittings permitting varying quantities of air to enter the sweet-gas stream.



Hookup arrangement of controls and general scheme of valve and controller.



Control system was placed in operation on a Friday noon as indicated by smoothing out of static pressure record on chart.

How it works . . . The general hookup of Hamaker's system and the two control devices used in it are shown in accompanying illustrations. Both of the controls were assembled at Columbia and are relatively simple. The speed controller for the compressor engine takes the place of the fly-ball portion of a regular speed governor. In function, the butterfly valve is a pressure regulator and is constructed accordingly.

In designing the speed controller, Hamaker used a 10-in. diaphragm from a standard control valve having a

1¼-in. stem travel. This diaphragm assembly is welded to a support plate as indicated in the accompanying sketch. Length of the lever arm, to which the diaphragm valve stem is attached, is important and varies with operating conditions along with the kind of speed governor used. Likewise, the points of location for connection of valve stem, dampening spring, and linkage to the engine's mixing valve are located according to governor and operating conditions.

To provide for speed adjustment, Hamaker placed a threaded rod at the fulcrum of the lever arm. This adjustment compensates travel of the valve stem. So as to avoid rapid movement of the lever arm, a dampening spring is placed between the mixing valve linkage and the diaphragm valve stem. This spring, a standard part for a compressor engine, operates to slow down valve travel and to check pulsations. In general, this spring takes the place of the usual spring on the diaphragm valve. Maximum travel of the valve stem is controlled by an adjustable stop which is set to limit the range of the governor.

The free end of the lever arm terminates in a yoke which is connected to the piston rod of the dash pot on the engines standard governor. The entire device is attached to engine's regular speed governor with three bolts.

Purpose of the butterfly valve is to maintain the desired pressure on the field gathering system. A counterweight is used instead of the usual spring to load the diaphragm. For Hamaker's installation at Columbia, an 8-in. diameter diaphragm having a travel of 1⅝-in. was used for the butterfly valve. Pressure at which the gathering system line is to operate is determined by the position of the counterweight on the butterfly valve shaft. By reversing position of the counterweight, as indicated by dotted lines in the accompanying sketch, the butterfly valve closes when pressure falls below 0 psig.

Constant pressure . . . As installed and adjusted for operation at Columbia plant, the control system is capable of maintaining a relatively constant line pressure under a field-load variation of 3 to 1. Adjustment of the speed controller involves setting the engine's governor for minimum field load. When the load is increased and thus steps up pressure in the line, the diaphragm valve, through the linkage to the governor, allows the compressor engine to increase speed. In case the pressure then drops, the engine speed is reduced until minimum set speed is reached. The maximum speed of the engine is determined by capacity of the compressor itself. Consequently, the controller is limited to maintain this maximum speed by its speed range screw.

Operation of the butterfly valve is synchronized with the speed controller. It normally holds line pressure to 0 psig. but with increase in pressure it opens and allows the gas stream to go to the compressor which, at the same time, is speeding up because of the increased line pressure.

This control system has saved Hamaker and his staff at Columbia many "headaches" and won top honors at a recent "Kinks Contest" held by the N.G.A.A.

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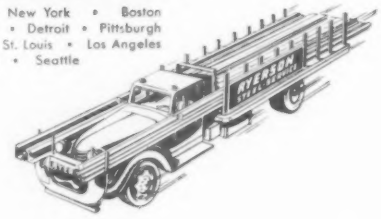

BOOK

STANDARDS FOR STEAM SURFACE CONDENSORS. Published by Heat Exchange Institute, 122 East Forty-second Street, New York. 20 pp. $2.

This is a revision of the book on the same subject issued in 1939 and 1940, and is one of a series of eight separate publications on different pieces of heat-exchange apparatus. The object of the booklet is to help the purchaser of condensers by defining essential terms and by setting up definite standards of heat-transfer rates and performance guarantees. It also contains material which is essential to engineers when writing specifications or designing surface-condensing equipment.

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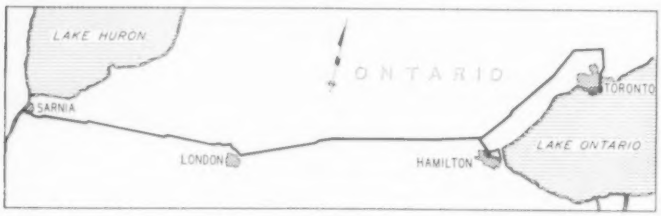
View showing simultaneous laying of two 10-in. lines for two separate companies in the same ditch along a narrow right-of-way adjacent to electric-power transmission lines during construction of the Imperial line.



Route of Imperial Oil, Ltd.'s, Sarnia-Toronto products pipe line.

IMPERIAL'S SARNIA-TORONTO PRODUCTS PIPE LINE

Unusual Ditching and Water Crossing Feature New Carrier

Line placed in same ditch with another pipe line. And it was laid across Hamilton Harbor in two big loops, thereby providing slack for future settling

SARNIA PRODUCTS PIPE LINE was the first major products line constructed in Canada. It is 188.4 miles long, from Sarnia to Toronto, with a takeoff terminal at London and a 6.7-mile spur line to Hamilton from the main line at Waterdown. The line carries gasolines, stove oil, diesel fuel, and heating fuels.

Imperial Oil, Ltd., decided to build the line as a plant facility in 1949, when rapidly increasing market demands showed a need for revision of its product transportation system between its Sarnia refinery and the London, Hamilton, and Toronto markets.

At the time, products were moved from the refinery by tanker to Hamilton and Toronto, and to Port Stanley where a marine terminal supplied the London area. These movements had to be large enough to cover summer demand and shipments into terminal storage for the four or five winter months when lake navigation is closed.

This article has been prepared for The Oil and Gas Journal by the staff of the pipe-line department of Imperial Oil, Ltd., Toronto.

Alternatives . . . Imperial was faced with the alternative of increasing its terminal tankage and lake tanker fleet or building a pipe line. It chose the pipe line for these reasons: over the long term it would provide more economical transportation; it would use less steel than a tanker-storage program, and steel was then in short supply; tank farms were located on harbor fronts where expansion possibilities were limited; it would not be dependent on climatic or seasonal conditions and would provide year-round supply, varying only with market demands.

Pipe . . . Initial design was based on throughputs of about 40,000 bbl. per day with one pump station at Sarnia; provision was made for the addition of a second station at London. The main line is 12¾-in. o.d. and 10¾-in. o.d. A.P.I. specification 5L, Grade B pipe obtained from Great Britain. The 132-mile section from Sarnia to Waterdown is 12-in. with 10 miles 0.375-in. wall thickness out of Sarnia and London, followed by 5 miles of 0.344-in. wall, and the remainder, 0.330-in.

The heavier pipe installed for high initial pressures out of Sarnia station was duplicated at London in anticipation of a future pump station at that point. A 550-ft. hydrostatic gain on the 56.4-mile section from Waterdown to Toronto allowed the use of 10-in. pipe. In the final 11.7 miles, 0.344-in. wall pipe was installed as an added safety factor. This section is laid in, and adjacent to, the city of Toronto. The remainder of the 10-in. was 0.307-in. wall thickness.

The spur line to Hamilton, which also has a drop in elevation of about 550 ft., is of two 6-in. lines of 0.280-in. wall A.P.I. specification 5L, Grade A pipe. Two lines of 0.432-in. wall about 6,000 ft. long cross Hamilton harbor.

Welding control was by visual inspection and radiography. Both X-ray and gamma-ray were used with about 50 welds checked in a normal working day. For the harbor crossing, all welds were radiographed and on city work, practically 100 per cent coverage was obtained by radiographic inspection. Both methods proved satisfactory, producing good pictures of the welds.

Coating and wrapping . . . The entire line was coated with coal-tar enamel 3/32-in. thick, impregnated with fiberglass and covered with 15-lb. asbestos felt. A cover of 36 in. was required in normal ground and 24 in. where rock was encountered. These depths were considered advisable in order to place the pipe below the level at which the frost would heave the ground and damage the coating or stress the pipe. Before acceptance the line was hydro-

statictally tested with water to 1,200 psi.

Pump station . . . The line has one pump station at Sarnia, designed to accommodate three 500 hp. pumping units, two of which were installed initially. This station pumps from ten 84,000-bbl. tanks which have separate tank lines manifolded at the station. Products pass through hay tanks, filters, and meters to the pumps. Present capacity is 40,000 bbl. per day of fuel oil and 44,000 bbl. per day of gasoline, with 6,000 bbl. per day takeoffs at London and Waterdown, the remainder moving to Toronto.

Ulltimate gasoline capacity could be 72,000 bbl. per day out of Sarnia, delivering 11,000 bbl. per day at London and Hamilton, and 50,000 bbl. per day at Toronto. This capacity could be achieved with installation of the third pumping unit at Sarnia and construction of a second pump station at London. Pumping units are four-stage centrifugal pumps coupled with electric motors, utilizing automatic sequence control and safety devices.

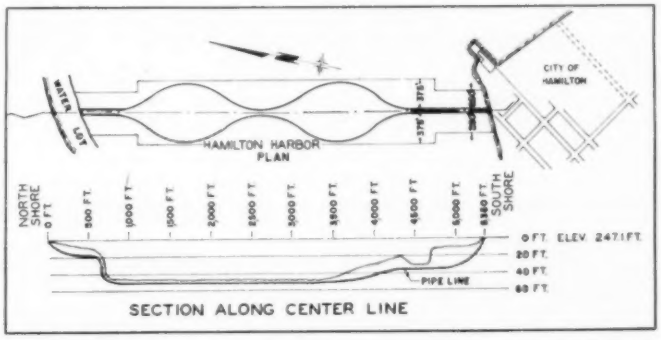
Metering terminals at London, Hamilton, and Toronto are all similar in design, passing the product through hay tanks, filters, and meters before discharging to storage tanks. At each, calibration equipment is provided to maintain a high degree of accuracy in the use of metering equipment. The station and terminals use the latest type remote-control equipment to facilitate operation and minimize contamination at batch changes.

Construction of the main line began October 15, 1951. The 64-mile section to London of 12-in. pipe was completed March 1, 1952. Temporary operation began immediately. In the construction of this section the winter proved to be the greatest obstacle. Snow and mild weather made the right-of-way a sea of mud and the contractor was all but stopped at times. Ditching machines could not work under these conditions, and backhoes were used. At one time 14 were being used simultaneously to prepare ditch.

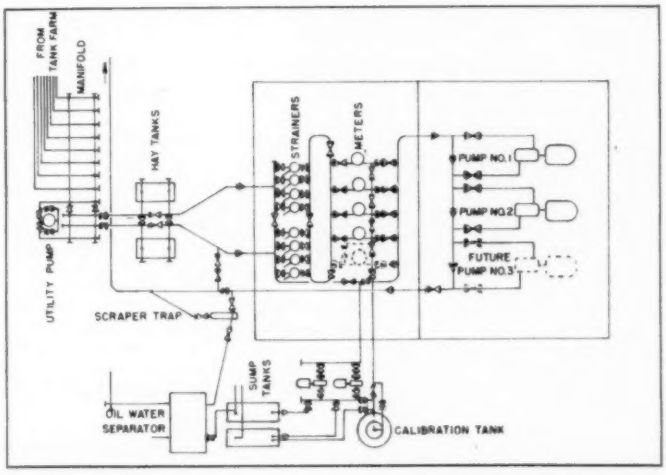
In spring of 1952 spreads moved east from London, at times completing more than a mile a day. In contrast with the adverse winter conditions, weather during the second construction phase was ideal. Rock was encountered in the London-Waterdown section but did not slow the work to an unusual extent. Rock was found sometimes only a foot below the surface, requiring the ditch to be drilled and blasted. Rock was encountered intermittently for about 25 miles east and west of Waterdown.

Hamilton operations: Simultaneously a small spread was working in the city

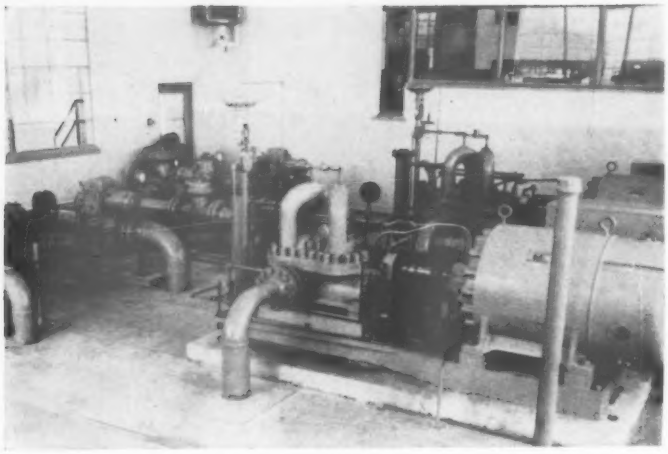
Pontoons supporting a 6-in. line suspended at depth of 10 ft. while it was pulled by steam winch prior to lowering to bottom depths of 25 to 50 ft.



Profile and plan diagrams of Hamilton Harbor submerged crossings for two 6-in. lines traversing a 5,300-ft. route.



Schematic diagram of piping of Sarnia pump station showing two initial pumping units and location of a third unit to be installed in the future.



Pump room of Sarnia station with two 500-hp. electric centrifugal units.

of Hamilton laying the two 6-in. lines from Hamilton terminal to water's edge on the south side of Hamilton harbor. Though this was an industrial area, negotiations with the Harbor Commission and the city itself provided a relatively easy location for the line. Totally, about 2,500 ft. was laid in the city area. Location work on the approaches to Hamilton terminal provided two possible routes: one passing around the head of the harbor through a railway marshaling yard, which would involve a great deal of difficult construction, or directly across Hamilton Harbor. The latter proved the more feasible.

Harbor construction . . . In preparation for the harbor crossing, soundings and bore holes of the harbor bottom were taken. These revealed conditions that had not been anticipated from previously available data. On the south shore, a shelf of sand and gravel extended about 1,400 ft. at a maximum depth of about 25 ft., after which it dropped off to the main harbor bottom at a depth of about 50 ft.

On the north shore a similar shelf extended south about 750 ft., at depths varying from about 5 to 10 ft., and then dropping off to the 50-ft. bottom. Core tests indicated that the harbor bed, which consisted of an oozy silt, would not support the weight of the pipe until settlement of almost 50 ft. had been reached. It was impossible to dredge a trench in this silt to a depth where firm bearing material could be obtained. The crossing was planned to allow the pipe to be free to settle for many years.

Submerged lines . . . A trench varying in depth from 6 to 20 ft. was dredged in the shelves on each side. In these trenches the lines were laid parallel and backfilled. Across the 3,000-ft. center section, each line was lowered into the soft silt in two large loops. This provided the necessary slack for future settling without subjecting the pipe to longitudinal stress. Maximum deviation of the loops was about 300 ft. from the center line of the crossing. About 250 ft. of slack was provided in each line.

Actual Construction

Actual construction of the crossing was made by pulling strings directly across the harbor suspended from pontoons 10 ft. below the surface to permit passage of launches and other small craft. Tugs were used to position the loops according to guide buoys previously set. The pipe was then cut loose from the pontoons and dropped to the bottom. Buoys which were attached to the pipe at 200-ft. intervals were checked after the pipe was lowered.

The information gathered in this manner proved that the pipe was settling slowly. It is planned that the settling of the lines in the harbor bottom will be checked with an electronic device which will indicate the depth of the lines.

Pipe for the Hamilton Harbor crossing was double coated and wrapped with enamel and glass mat and single wrapped with felt and rock shield.

Two lines in ditch . . . About 30 miles of the 56-mile stretch of 10-in. pipe was laid adjacent to high-voltage electric transmission lines on the provincial power commission's land. This simplified the right-of-way problem in an extremely difficult area but slowed down construction. There was insufficient room to pass equipment between the towers and the ditch, which was located on the edge of the commission's right-of-way and caterpillars had to unhook from the pipe, go around the towers, and hook on again. This, as well as the extreme care which had to be exercised in working under high-tension power lines, slowed down construction.

Also in this section Imperial laid in the same ditch a second 10-in. line for another company. As a result, certain of the construction features were complicated. In pipe bending, it was difficult to bend the two lines exactly alike and place them in a 42-in. ditch keeping them separated properly. The second pipe was a different grade steel and the welders had some difficulty at first in adjusting to welding simultaneously on two grades of pipe.

The approach to the Toronto terminal was made by passing north of the city proper and going south through the center of the city along the bottom of the Don River Valley, a deep ravine not used for residential development and only sparingly for industrial use. In this manner it was possible to get within 1 mile of the terminal before encountering utilities or the problems associated with city work.

Use of the route of a proposed two-lane highway of which only one lane was completed made construction of the last mile relatively easy. While the work was difficult, there were no long sections of pavements to be lifted and only two complex road crossings.

Right-of-way . . . Probably the largest problem during construction was obtaining right-of-way. The line is set up as a division of Imperial Oil, Ltd., operating as a plant facility, and as such is not incorporated under any laws which give the right of expropriation. During location many reroutes were made, especially in the areas near cities. In one instance, 10 alternate locations were tried before the right-of-way was completed.

Initial deliveries of products to Hamilton and Toronto commenced on October 8 and November 6, 1952, respectively.

Contractors . . . General contractor for the Sarnia station and the line was Comstock Midwestern, Ltd., of Leaside, Ont.; the London terminal was built by Shaw Construction Co., of Sarnia, and the Toronto and Hamilton terminals and Waterdown administration center were constructed by A. E. Rule, Ltd., of Toronto.

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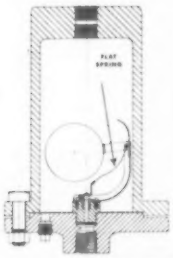

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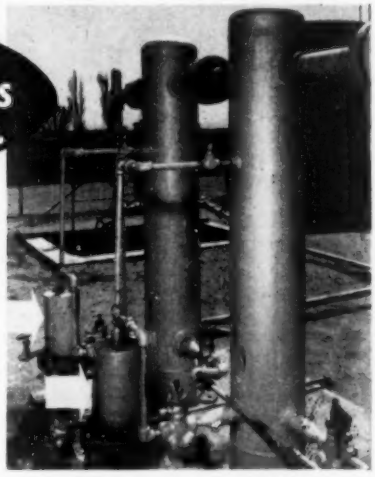

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Schlumberger Well Surveying Corp.'s new $6,000,000 headquarters in Houston is more than just a sleek modern building on the Gulf Freeway. It is a symbol of the company's faith in the future of oil, and a monument to its past services in the oil fields of the world.

New Schlumberger Plant Ready for Operations

by C. Malcolm Davis
Gulf Coast District Editor

SCHLUMBERGER WELL SURVEYING CORP. opens its new main offices and plant formally in a new location at Houston on May 4. The new plant has floor space of 241,564 sq. ft. Facilities include administration and engineering buildings, warehouse, truck shop, winch house, electrical production and machine shop, and an engineering testing and power building.

Building Details and Functions

The seven buildings are of steel-and-masonry construction. The walls fill in the frame conveniently so that when expansion is required a specific wall may be removed to make room for the extension.

The administration building, 300 ft. long with three 84-ft. wings, contains 162 rooms to accommodate executive and accounting functions. The general library is also housed in this building. The engineering building has 12 electrical-engineering laboratories, an engineering library, and a large mechanical-drafting and designing room.

Developmental engineering work on all kinds of well-surveying techniques and some well-completion techniques are perfected. In other words, all new, practical ideas are tested. As a result, many times a prototype of the new equipment is made. If the new equipment gives satisfactory results in the field, the job of producing the equipment is given to the machine and electrical production shops.

Neutron-logging equipment and gamma-ray units are tested and evaluated. The evaluation is aided by conducting experiments with special radioactivity countertubes.

An "elephant bath" of cylindrical shape has been installed outside with protection over it. The resistivity of its water may be varied so as to duplicate actual field conditions in a well. An efficient pumping unit can fill or empty the bath quickly when getting ready for new tests.

A high-pressure laboratory provides for testing equipment in temperatures up to 400° F. and in pressures up to 25,000 psi. The conditions approximate what would prevail in a well 5 miles deep.

The truck shop can turn out 12 new surveying units a month. Trucks of usual design are received and the truck frames are completely redesigned to accommodate full well-surveying equipment even including photographic and blueprinting facilities.

The electrical production and machine shop make all of the electrical and mechanical equipment with which to run an electrical log, make electronic equipment for running neutron and gamma logs, and make the perforating equipment as well as numerous other items.

Historical Resume

The concept of employing electrical principles for geophysical prospecting came to Conrad Schlumberger in 1911 or 1912. The early experiments were conducted in the basement of Ecole Nationale Superieure des Mines in Paris.

One of the first successes came after World War I and was the discovery of a copper ore mass in Yugoslavia.

In 1925 a Romanian oil company engaged the services of the Schlumberger group to use their surface exploration methods. As a result, the Aricesti Dome was discovered.

In 1929 the idea of measuring resistivity in situ (in place) was thought of. Experiments were carried out in drill holes so as to obtain the actual resistivity of formations which outcropped in the neighboring area. As a result, it was possible to make a point-by-point diagram of resistivities. The first of these diagrams was made at Pechelbronn of Alsace in September 1927.

With the resistivity log it was possible to prepare subsurface geology

SCHLUMBERGER OFFICIALS . . . Seated are: D. C. McCann, vice president, operations and services; W. J. Gillingham, executive vice president; P. Schlumberger, president; E. G. Leonardon, director in charge of special assignments, and A. Blanchard, vice president, engineering. Standing are: A. Vennema, vice president, personnel; A. J. Peissel, assistant to the president; W. M. Padgett, controller; R. R. Rieke, sales manager, and W. B. Steward, assistant to the president.

sketches without employing coring devices. In 1929, operations were going on in Europe and South America.

United States activity began in California in 1933 with Shell Oil Co. on a year-to-year basis. From 1934 everything was on a sure footing for the company. The advances in techniques and interpretation are well known by most of the oil fraternity.

Rendered Services Defined

. . . **Electrical logging**—A recording of the spontaneous potential (S.P.) and one or more resistivity curves, the purpose of which is to study the strata penetrated by the well. There are usually three resistivity curves resulting from three electrode spacings appropriately chosen to give maximum information.

. . . **Micro-Logging**—Very shallow resistivity curves taken along the walls of a bore hole to locate permeable zones and provide detailed record of the strata. Micro-Log use along with conventional logging aids in selecting potentially productive horizons in both clastic and carbonate formations. It gives information as to limits of the formation, porosity index, and formation factor.

. . . **Laterologging**—A resistivity log obtained by means of a focused sheet of current directed laterally from the bore hole. Advantage is to minimize effects of the bore hole and of adjacent strata on the particular stratum or portion of stratum under investigation. It gives accurate information on formation detail in salty muds and hard formations, gives clear definition on thin beds, and functions best where a conventional log is least useful.

. . . **Induction logging**—A conductivity or resistivity log obtained by means of an induced current. It is not dependent upon conductive muds in the bore hole to establish electrical continuity with the strata. It is used principally in wells drilled with oil-base mud.

. . . **Correlation logging**—Electrical surveys made in shallow test wells for the purpose of correlating strata from well to well.

. . . **Gamma-ray logging**—A log made by means of recording the natural radioactive emanations of the strata. Gamma radiations are recordable through as many as three strings of casing in any kind of fluid.

. . . **Neutron logging**—A recording obtained by bombarding the strata with a radioactive source. It may be used in cased holes or otherwise along with gamma log. A combination of induction log, gamma log, a neutron log, or both, aids in interpretation in oil based muds or empty holes.

. . . **Radioactive marker**—A bullet, containing a radium salt, shot into the formation, often through several inches of cement, is used primarily for determining accurate depths in order to perforate specific zones of an oil-bearing formation with relation to oil-gas or oil-water contacts or perforating thin beds at great subsurface depths.

. . . **Section gage or caliper logging**—Measures the cross-sectional area or the diameter of a bore hole.

. . . **Directional survey**—Determines amount and direction of deviation of a bore hole from the vertical.

. . . **Dip-meter survey**—Determines amount and direction of dip of strata in a bore hole. Provides data assisting in solution of structural and stratigraphic problems met in drilling all types of structures favorable to oil accumulation.

. . . **Depth determination**—Performed with the electrical log or the casing collar locator. This locator operates by means of a magnetic detector. Records depths of pipe junctures as well as regular casing collars.

. . . **Temperature survey**—It records temperatures in a bore hole by means of an electrical resistance thermometer.

. . . **Geophone survey**—Lowering of a geophone in a well to record seismic waves generated by explosives.

. . . **Sidewall-coring percussion device**—It takes sidewall cores. The core container is fired by an explosive charge and the container attached to the gun by two lengths of steel wire is retrieved by means of a cable connected to the gun.

. . . **Sidewall coring mechanical device**—Used in hard formations. The core is taken by diamond drilling from the wall of the well.

. . . **Precision gun perforating**—Device permits shooting at the desired depth with the aid of a collar locator employed for depth control.

. . . **Super gun perforating device**—It is designed to give deeper penetration than other designs of the company. In many cases of field application, fluid has been obtained after other perforating methods have failed.

. . . **Shaped-charge perforating device**—Has its penetrating force in the focused explosive power of the charge itself. Aids in completion of thin zones involving oil-water or gas-oil contacts, completions at high temperatures of 300°-350° F., large perforating operations, and perforating in small dimension pipe.

. . . **Expendable shaped-charge perforating**—It is employed for perforating casing below tubing.

. . . **Casing collar location**—Collars can be accurately located as to depth. A magnetic detector is part of the setup.

. . . **Baker bridge plug**—It is run on Schlumberger cable and set without exerting pull on the cable.

. . . **Baker production packer**—It is run and set as the bridge plug.

New $8,000,000 Plant

(Continued from page 93)

Effluent is first treated with sufficient acetylene and HCl to consume unreacted nickel carbonyl. An excess of the carbonyl over HCl is desired to avoid corrosion and to allow the use of a higher ratio of CO gas to the carbonyl. For acrylates of water-soluble alcohols, a procedure was devised by R. & H. engineers to utilize recycled nickel chloride solution to salt out the acrylate from the crude reaction product containing acrylate, alcohol, and nickel chloride. In practice, this operation is carried out continuously in an extraction column.

Following a caustic wash, the crude-reaction mixture is fed in at the bottom of the column. The nickel chloride brine introduced at the top of the column dissolves the alcohol and nickel chloride in the crude reaction mixture. Organic material—about 90 per cent acrylate—is taken overhead and purified by distillation. Bottoms containing nickel chloride, alcohol, and some acrylate are distilled. With the alcohol and acrylate thus removed, the nickel chloride stream is split: sufficient material is returned to the extraction column for its operation and the remainder is reconverted to nickel carbonyl.

Design engineering . . . Plant operation has been living up to expectations in regard to throughput, yields of various steps, and purity of end products. The design by Dr. D. R. Merrill and his engineering staff was completed without the benefit of usual pilot-plant data.

Instead, the process was operated under carefully controlled conditions in the laboratory for an extended period on a 24-hour schedule, in equipment designed for continuous flow. Data obtained from the bench setup were used as the basis for the full-scale production unit.

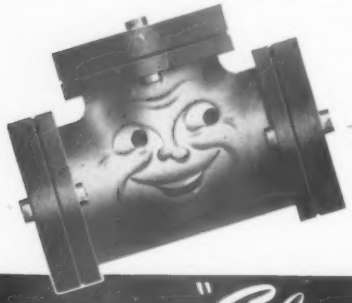
Also of interest is the collection of data on the toxicity of nickel carbonyl. This compound was known to have toxic effects. However, permissible concentrations in air and instrumental detection methods had not been determined previously. As a result of an intensive study, an automatic detector system has been included as part of the plant which sounds an alarm if a dangerous concentration of nickel carbonyl is reached.

Other products . . . The versatility of the process is quite remarkable in the synthesis of monomers containing the acrylyl group. Not only may acrylic esters of a wide variety of alcohols be synchronized, but also acrylic acids, acrylic anhydride, and N-substituted acrylamides. It is the only practical method for making acrylic esters of tertiary alcohol such as tertiary-butyl alcohol; all other processes involve conditions under which the tertiary alcohols are dehydrated.

In addition to primary, secondary, and tertiary aliphatic alcohols, the catalytic process is applicable to cycloaliphatic alcohols such as cyclohexanol, unsaturated alcohols such as allyl alcohol, and ether alcohols such as 2-ethoxyethyl alcohol.

By replacing the alcohol with water, acrylic acid can be produced in excellent yield from acetylene and carbon monoxide. In this case, an organic acid should be used in place of hydrochloric acid and it is most convenient to use acrylic acid. This added acid comes out of the process in the form of nickel acrylate and in the steps of converting the nickel to nickel carbonyl, the acrylic acid is recovered and a portion is recycled back to the process.

In order to achieve the maximum ratio of carbon monoxide gas to nickel carbonyl, a solvent is used in the acrylic acid process, preferably a ketone that



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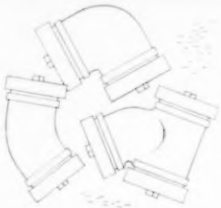

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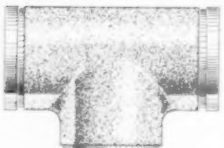

Enardo Shur-Loc Fittings, with Tite Line Clamps are for those who want grooved fittings. Shur-Locs, a new product of the Enardo Manufacturing Company, can be used with any standard two-bolt clamp such as the Tite Line design with its improved gasket. They are available in all standard sizes ranging from 2" to 12". Designs include Couplings, End Caps, 90° Ells, Tees, 45° Ells, Flanged Adapters, and Shur-Loc Reducers. Ruggedness of Shur-Loc fittings is shown by actual laboratory tests indicating 3400 lbs. hydrostatic pressure before the 2" Shur-Loc Tee ruptured. Write for Enardo Bulletin.

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is at least partially water-miscible. Glacial acrylic acid can be obtained readily from this reaction by utilizing the hydrating tendency of nickel sulfate. To the crude reaction mixture containing nickel acrylate, acrylic acid, water, and ketone solvent, there is added sufficient sulfuric acid to convert the nickel acrylate to nickel sulfate and acrylic acid.

The nickel sulfate separates out as nickel sulfate hexahydrate, which is not only in a particularly favorable crystalline form for easy filtration, but also gives a filtrate of essentially anhydrous acrylic acid dissolved in ketone. Stripping off the ketone removes any remaining water, and the glacial acrylic acid is purified by distillation.

Another variation of the R. & H. process is the use of primary or secondary amines in the place of alcohols, to give N-substituted acrylamides.

At the present time, the plant is using calcium carbide from which acetylene is obtained for the process. However, as volume increases to warrant it, acetylene can be prepared at the plant from natural gas.

An interesting commentary in the way processes affect economics may be seen in the initial manufacture of the monomers by the sodium cyanide-ethylene chlorohydrin reaction at R. & H.'s Bristol, Pa., plant. First sales of monomers were made in 1936 at a price of $1.05 per pound. A subsequent improvement in the process came when ethylene oxide and hydrogen cyanide (manufactured catalytically from natural gas, ammonia and air) were reacted. And finally the new process has dropped the prices to less than half the 1936 cost.

Uses . . . The monomers are polymerized to colorless transparent polymers with high heat and light stability, flexibility, and chemical resistance. Plexiglas is probably the best known acrylic product. Nonyellowing coatings for playing cards, salt-resistant chromium and leather finishes are examples of uses for the acrylates. They are also used for specialty purposes with synthetic rubber and a newer use has been in soil conditioners.

Prolific Water Flood in East Kansas

(Continued from page 100)

indicated, the daily input rate gradually decreases with time, which is the normal trend during and after the fillup periods. The second curve is a plot of the bottom-hole pressure. From study of these data, it is apparent that the bottom-hole pressure is being increased continually in order that the established rate be approached or maintained. This condition is true of most of the input wells.

Oil-Well Performance

Production from individual wells varied from ¼ to 2½ bbl. of oil per day, and averaged 1½ bbl. for a 12-month period preceding water injection. Water production varied from 0 to 5.7 bbl. per well per day, and averaged ¾ bbl. per day.

Under water-flood operations, oil production for one well in particular reached a peak of 330 bbl. per day. Cumulative flood oil production from two oil wells each has exceeded 100,000 bbl.

As soon as oil banks from neighboring input wells contact each other, interference and distortion of the pressure distribution and fluid movement will develop in an oil reservoir. Where there is no areal distribution of water-input wells on a project, a large part of the advancing injected water and oil bank from an input well will have a tendency to be transmitted in the direction of an uninvaded region, resulting in nonuniform flood fronts.

Subsequent development with com-

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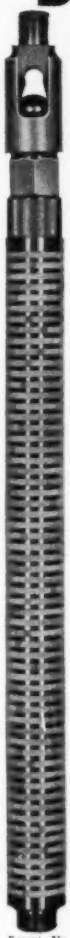

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plete areal distribution of water-input wells and oil wells in conjunction with attempts to obtain a uniform flood front in the well network usually tends to equalize the fluid movement and pressure distribution in the reservoir. This condition causes the oil wells in the initially developed area to produce at a much greater productive capacity, and can be illustrated best by the performance curve of Well "A" shown by Fig. 4. The well is a pattern five-spot oil producer located within the pilot area. As the result of completion of two extensions, the total fluid production from this well increased 40 per cent, resulting in an arrested oil-production decline for nearly a year following its peak output. Afterwards, the well resumed a normal decline.

Well "B" was also a pattern five-spot oil well. The effect of advancing fluid fronts from the water-input wells was not apparent on this well until 9 months after water was injected into two of the related five-spot input wells. After reaching its peak production, the well followed a normal behavior through March 1952. Since that time, a gradual daily increase in the injection rates, accompanied by increased bottom-hole pressures in the related five-spot input wells, arrested the oil-production decline for the last 9 months of 1952.

Unit-Flood Performance

Oil production for the entire project during the 12-month period preceding pilot-water injection averaged 34 bbl. per day from 23 active oil wells. The project reached a peak production of 1,797 bbl. per day in July 1950, only 18 months after water was injected into the pilot area. This is equivalent to a 5,200 per cent increase in daily oil production.

At the end of 1952, production had declined to an average daily production of 320 bbl. of oil; at that time, 27 active oil wells were producing 4,300 bbl. of water. Water-injection rate on January 1, 1953, was approximately 5,000 bbl. per day. Over-all performance for the project is shown by Fig. 5.

Cumulative oil production from water-flood operations from starting date in February 1949 to January 1, 1953, amounted to 1,217,000 bbl. Cumulative water production for the same period was 3,358,000 bbl. Ratio of cumulative produced water to cumulative produced oil is 2.75 to 1. Ratio of cumulative water injected to cumulative oil produced is 5.07 to 1.

A production curve for the primary and water-flood operation is shown by Fig. 6. Comparison of the over-all primary phase with the over-all water-flood phase is shown by Table 1.

Acknowledgment

The author thanks W. L. Horner and J. F. Adkisson, Jr., both with Sunray Oil Corp., for their constructive criticism of this paper.

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Geologic Report

A report describing the outcrop sections and subsurface geology of Ordovician and Silurian rocks in northeast central Saskatchewan has been prepared by W. O. Kupsch, assistant professor of geology at the University of Saskatchewan.

Information on the area was gained through field work and studies of oil-well samples and cores.

Surface work was conducted in what is referred to as the Namew Lake-Ballantyne Bay area. It is bounded on the east approximately by the Saskatchewan - Manitoba provincial boundary. The north boundary is formed by the pre-Cambrian rock of the Canadian Shield. An arbitrary line connecting Cumberland House with Ballantyne Bay constitutes the west boundary. The Saskatchewan River limits the area on the south.

The subsurface study covers the Prince Albert - Hudson Bay Junction

area. It is situated largely within surveyed territory, and stretches from Township 43, north to Township 57, and from Range 11w3 to Range 30w3.

The report, "Ordovician and Silurian Stratigraphy of East Central Saskatchewan," may be obtained from the Mines Branch of the Department of Natural Resources in Regina for $1.

What Oil Companies Want in Safety

(Continued from page 95)

face, or the so-called underground damage.

There is always, of course a possibility of injuring or destroying personal property such as automobiles, trucks, cattle, fences, timber, gates, or like objects, by reason of careless operations around the well. This, too, is a form of economic waste and, additionally, entails a smear upon the good name of the oil company-operator, the contractor, and upon the petroleum industry generally.

The second category of damage to property is that of underground damage. Of course the most obvious illustration of this is that which follows a blowout. Fortunately, these are relatively rare. Many of you have never actually suffered a serious blowout in your long experience, but the danger and the hazard is there and the results are so serious as to justify every precaution at your hands to prevent wherever possible this type of occurrence.

A more common illustration of underground damage but still one of major importance is that which results from well completions or abandonments without proper safeguards to prevent commingling of substances from one stratum with substances of another stratum beneath the ground.

Damages for underground waste in a proved oil or gas field could well be astronomical in amount. For this type of damage, assuming no injury to person is involved, the principal concern of the operator is the actual loss occasioned to his lease and the liability which he may well be subjected to by reason of damage to the mineral interest of the royalty owners and to the mineral and leasehold owners on adjacent tracts. Limits of insurance coverage here are always inadequate when compared to the potential liability which a catastrophe of this kind could impose upon the operator and upon the drilling contractor.

Third Point of Safety

Those of you who have seen the havoc to the countryside wrought by a gas or oil well out of control for as long as a week or 10 days can easily visualize the surface damage. The sand and salt water which come from a wild gas well makes the adjoining countryside look bleak and desolate and invites damage claims for miles around from farmers with poor crops, rusty fences, farm equipment, automobiles, and other ferrous objects. As serious as this damage is, the potential of it is small when compared with the underground damage which may at the same time be occurring.

Recently in the Texas rice country an operator suffered a judgment loss of $100,000 where salt water seeped from a disposal pit into fresh-water irrigation wells down dip and nearly a mile away. Recently also, the Texas court has reversed its long standing rule to the contrary and now permits a claimant to recover from one wrongdoer **all the damage** to which several wrongdoers may have separately contributed.

Another form of protection which the oil company (operator) expects from the contractor is from the effect which careless operations will have upon his good name. Our operations in connection with oil are not complete until we have manufactured and sold as gasoline and other consumer products the production of our oil wells. The

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oil industry is a very competitive industry. Unless we maintain our good name with the public our sales operations suffer.

Your rig may be upon our lease for a few months while drilling it for us, but the oil company will remain, producing the lease, long after your rig has moved away. Unnecessary lease damage, often as insignificant as a fence cut in moving the rig and not properly repaired, or an extra trail used by the crew which may be the cause of later surface erosion, or the treatment which the surface owner or his tenant gets when he complains about these items, may set the course of the operator's relations with that man and his family throughout the 20 or 30 years which follow the completion of the well.

Most of you have experienced the ire of the family whose pecan tree was cut to enable the rig to be skidded, or whose prize bull got in the slush pit and "took sick and died," or who bitterly objects to squirrel or quail hunting on his tract by the drilling crew. The harm which is done to these claimants does not create any great economic loss.

We (the oil companies) are protected by your agreement to indemnify us in dollars for claims caused by that type of conduct, but there is no way for us to satisfy this claimant that you were the malefactor and we were not. The farmer does not understand that kind of talk because he knows that he sold his lease to us and that it is our well. What has been hurt there is our good name.

Operators, through their public-relations staff, through their advertising, and in almost every conceivable way, try to build up the good names of their companies. The land and lease man who 10 years after such damage comes back and tries to lease the land for a deep test suffers while explaining to that landowner why he should deal with his company or how that damage was not really caused by the company, but was caused by the man who drilled the well for them. And so the protection of the good name of the operator is another reason why safety in drilling operations is reasonably required by the operator.

Fourth Point of Safety

Fourth and last reason why safety in drilling operations is necessary is to protect the good name of the petroleum industry generally. In the past several years the petroleum industry has, through the American Petroleum Institute, the Oil Industry Information Committee, and the various trade associations, expended much money and labor in developing a public-relations program designed to benefit its good name. You as a drilling contractor are a part of the industry. You have seen the efforts which have been made and you know of the money which has been spent to give the industry a reputation for progressiveness and responsibility, ready to bear its share of the social consequences of its acts and to carry its portion of the load of any obligation, either in peace or war.

Specific acts of carelessness do not always affect the good name of the petroleum industry, but the effect often is where you least expect to find it. The attitude of a member of the Legislature toward the oil industry or toward an oil-industry matter may be directly traced to an unhappy experience which he had individually, or as an attorney for someone suffering damage through carelessness. You may discover it on a jury which sits in a case for you and where the cause of their verdict in your case lies in the long-forgotten act of one of your competitors. You may find it on a board of equalization which sets your taxes, or on a town council when you want to lower a curb to make a driveway to a filling station. These influences cannot be measured in terms of causation; that is, you cannot trace them to a given event or incident, but collectively they exert a tremendous

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impact upon the every-day contacts within the oil industry. **The manner in which you, as a drilling contractor, perform your contract has a definite influence upon the good name of the petroleum industry generally.**

What Contractor Must Hope

Now, just what is it that the operator is absolutely entitled to have from a contractor to assure these safe operations?

First, he is entitled to have you use a rig and equipment of sufficient capacity and in mechanical condition to safely perform the contract. Because it is your rig and you are independent contractors we must largely rely on you to inspect your machinery and to see that it is in such condition. This is all the more reason why the operator has an absolute right to expect the drilling contractor to furnish tools and equipment suitable to perform the work safely.

Second, the operator is entitled, as a matter of right, to expect the **contractor to furnish adequate supervision and a properly trained crew** to operate the tools in a safe manner. The drilling of an oil well is an act of team work. Team work can only be obtained from a trained drilling crew, adequately supervised.

The manner in which the operation is performed depends upon the experience and training and the mental attitude of each member of the drilling crew. Because you are an independent contractor we must rely upon you to furnish safe employes, physically and mentally able to operate your drilling rig as a team under proper supervision furnished by you.

Third, the operator can reasonably expect the drilling contractor to furnish his own employes and those of the operator whose presence is necessary around the rig with **a reasonably safe place in which to work.**

Fourth, the operator is entitled to expect that you, as a drilling contractor, will at all times **have at the rig someone in authority with sufficient judgment to minimize the many opportunities which during the ordinary course of drilling the well present themselves for the making of poor public relations.**

I have not attempted to state any reasons why, as the drilling contractor, you should be separately concerned with the results of this safety program. Every reason which I have outlined as a reason why we, the operators, insist on safety, plus some additional good ones apply to you as well.

Insurance Matters

Your insurance costs, of course, are directly affected by your safety record. Most of you are acutely conscious of the increasing cost of all types of insurance coverage.

In closing, I want to call to your attention what some of us are sometimes prone to forget. Insurance is a cost-plus commodity. For every dollar of insurance premium which you pay, approximately half goes to the cost of servicing your policy, while only the remaining half is what is necessary to pay the underwriting cost, meaning, of course, direct payments to claimants.

If insurance is a cost-plus commodity to you—and I assure you that it is—over any substantial period of time you are going to pay in premiums just about twice as much as your actual casualty losses are. Why twice as much? Because only half of your insurance dollar goes to pay those costs.

Now, if these facts are true, isn't it good business for you to try to prevent every accident of every kind, when you know that for every accident prevented you save yourself 2 dollars for every dollar that accident would have cost you? The operator has every right to expect you to save on that type of expense just the same as he has the right to expect you to save in drilling mud or any other cost incident to drilling because all these costs are reflected in your per foot and day-rate prices and he pays the bill.

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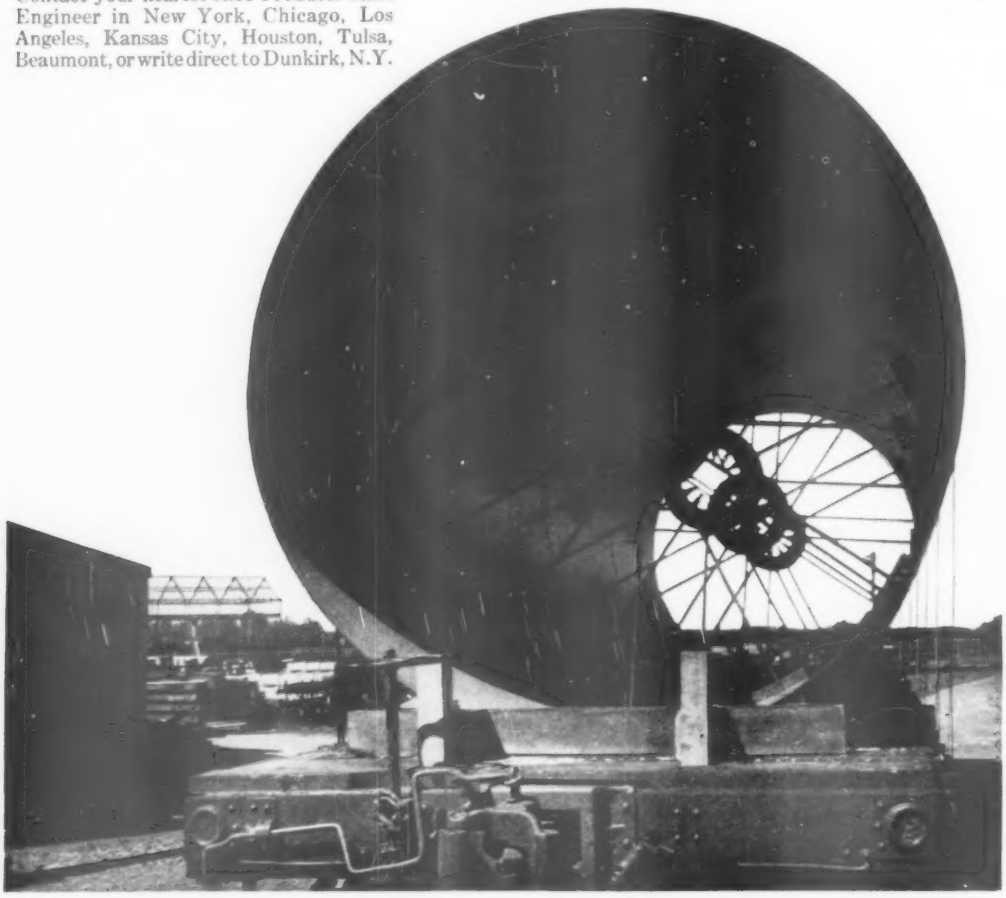
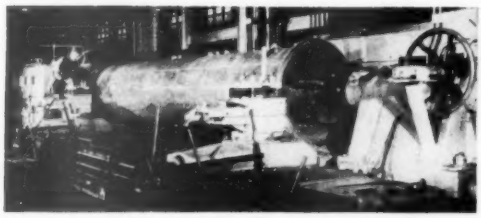
TUNNEL INTERLININGS furnished by Alco in cold-rolled, carbon-silicon steel sections 40 ft long and 10 ft 6 in. in diameter will reinforce the outlet end of New York City's new $44,000,000 deep-rock East Delaware Water Supply Tunnel. Held to close dimensional limits, electric fusion welded throughout, they are the latest of many special piping sections fabricated over the years by Alco for New York water supply projects.

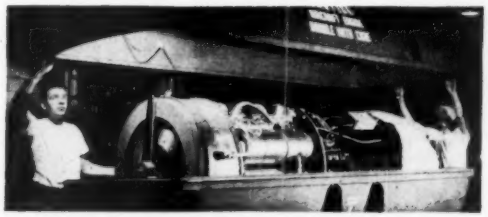


and experience produce...

New Industrial Problems



GIANT LATHE at Alco's 31-acre Dunkirk plant finishes and faces both flanges simultaneously on steel pipe up to 41 in. in diameter! Special machines like this, many of them Alco designed and all guided by the skilled hands of veteran craftsmen, help Alco solve the toughest of metal-fabricating problems.



STEEL "CANS" FOR JET ENGINES, mass-produced by Alco, are carefully engineered to meet strict Air Force specifications. Example: they must "provide a barrier against the entry of water, dust, air and moisture *without* the aid of separately applied sealing compounds or materials."

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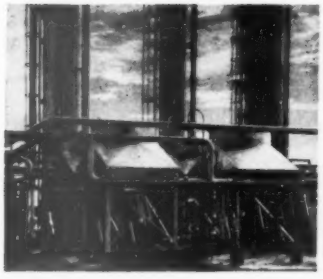
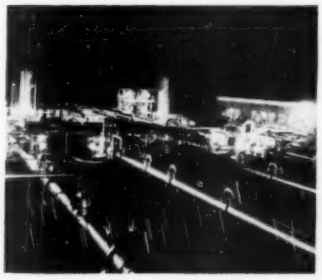
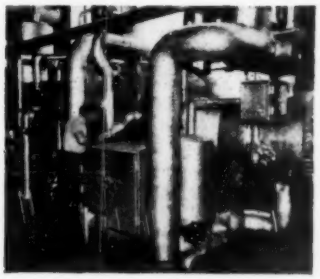


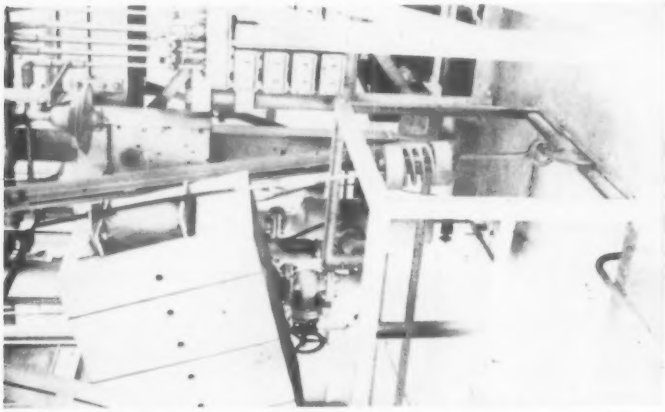
"UNI-BUNDLE UNITS," with their specially fabricated steel headers, demonstrate the versatility of Alco Aircoolers. Vertical partitions welded in the headers allow several different vapor or liquid streams to be handled in a single tube-bundle. Here, for example, at a large Southwestern natural gasoline plant, the Alco Aircooler at right not only cools the oil but also condenses the overhead vapor from the stream.



"TRAIN" HEAT EXCHANGERS, designed and built of nickel steel by Alco for the Tennessee Gas Transmission Company's new gas processing plant (the world's largest) at Gabe, Kentucky, helped cut both installation and operating costs. Their flange-to-flange construction minimized the amount of connecting piping required, while their huge size (42 in. in diameter, 150 ft long) assured maximum processing efficiency.



SPECIAL ALCO FLEX-TUBE EVAPORATORS at the Carolina Power and Light Company's new 150,000-kw plant at Goldsboro, N. C., produce vapor containing not more than 0.5 parts per million of mineral solids, hold make-up to less than one-half of one per cent. With its patented Flex-Tube construction, this Alco evaporator offers industry a positive-acting thermo-mechanical descaling device for straight-tube installation.



VIEW OF shock absorber on catalyst line counterweight, made with aid of automobile coil spring, which takes the "jiggle" out of the counterweight when plant is on stream.

Shock Absorber for Refinery Catalyst-Line Counterweight

TO reduce the continuous "jiggling" movement of the counterweight on a catalyst line while the plant is on stream, one of the process engineers of National Cooperative Refinery Association, at McPherson, Kans., decided that an adaptation of a front coil spring of an automobile might do the trick if it could be mounted in an effective cage.

How it was made . . . Two steel cups were obtained, similar to the retaining device on the front-spring suspension of an automobile, into which the spring could be placed for confinement while acting as the "shock absorber."

A rectangular cage around the pit, into which the counterweight settles when the plant has been shut down, was made of substantial angle iron and anchored in the concrete pavement at the catalyst plant. A heavy plate, shaped to lock beneath the bottom rail of the cage was provided as an anchor for the bottom retainer of the shock absorber.

A similar plate was bolted to the flanges of the structural I-beam, supporting the counterweights, to attach the top retainer of the coil-spring dampener.

Both cups confining the spring were pierced with two holes, through which the rods were passed which connect to the upper and lower anchors. The bottom rod extends upward through the bottom cup and through a similar hole in the top cut with a nut run down on threads, provided on that end of the anchor rod. The top rod was supplied with a long threaded section to provide a wide degree of adjustment.

Attachment . . . Attachment of the shock absorber is done after the plant has been brought on stream and temperatures have risen to the point that the catalyst line is expanded to its normal operating length.

The top bolt is slipped through the hole in the retaining plate on the counterweight I-beam and the lower end, with the bottom clip plate inserted beneath the frame of the safety cage so that the shock absorber unit is vertical. The nut placed on the threaded end of the long upper bolt, which is run down as far as necessary to apply compression to the spring until vibration is reduced to a minimum.

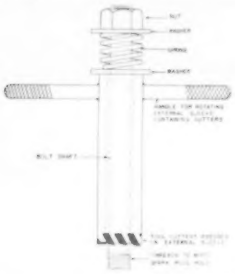
By careful adjustment practically all of the vertical up-and-down movement is arrested. Benefits expected are the protection of the bellows-type expansion joint, and reduced wear in the pin and bearings of the counterweight connections.

Tool Devised to Clean Recessed Spark-Plug Seats

A simple tool has been devised for cleaning recessed spark-plug seats on large compressors.

The tool consists of a short round cylinder equipped with a number of small-tool steel cutters on one end. The diameter of the cylinder is the same as diameter of the spark-plug seating surface. When the tool is inserted into the recessed portion of the cylinder head and rotated, the cutting teeth effectively clean the plug seats.

The cylinder, which is equipped with a T-shaped handle, fits over a large guide stud which is screwed into the spark-plug hole. The other end of



the stud is equipped with a spring held between two washers and a hexagonal nut. By adjusting the nut, pressure can be applied to the cylinder during cleaning of the seat.

Before the tool was available, the practice had been to use various types of scrapers, chisels and screw drivers for cleaning the carbon and old gasket from the seating surface. Besides not doing a thorough cleaning job, these tools frequently damaged the seat.

The new method was suggested by Marshall G. Pruyn, Jr., first-class machinist for Esso Standard Oil Co., Baton Rouge, La.

Wire Rope Used As Flex Handles on Cold Chisels

Breaking of wooden handles used with cold-cut chisels can be a thing of the past with the ingenious use of some wire rope and standard 1-in. pipe.

A short length of ⅞-in. wire-rope cable is passed through the handle opening of the cold-cut chisel and welded in place. The cable is then passed through a length of 1-in. standard pipe, shorter in length than the cable, and welded at the end of the pipe.

The pipe thereby provides necessary

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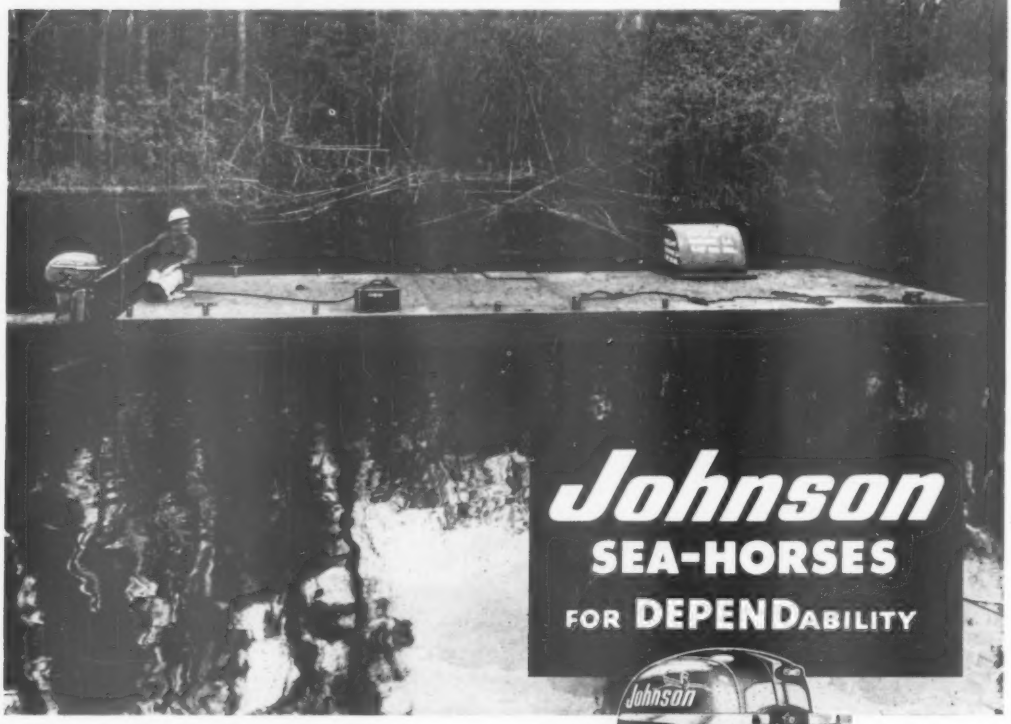
New Way to Move Oil!

Oil well owner, P. H. Camp, of Reserve, La., transports 101 barrels of oil per trip on his 30' by 15' barge—powered by a 25 hp Johnson Sea-Horse.



This job used to be done with a tow boat. It was expensive. It was difficult.

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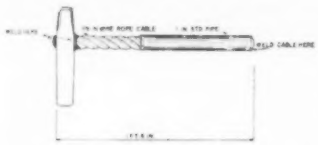


rigidity to the tool while the exposed length of wire rope provides flexibility. The wire rope is flexible enough and strong enough to resist repeated blows of a sledge hammer which might glance off the head of the chisel.

When the wire rope has been damaged to the extent that it is not capable of supporting the chisel firmly, it may be easily removed and replaced.

The use of the wire cable provides a handle with longer life and one which may be replaced from scrap materials on hand. The innovation is used by Sinclair Refining Co., Houston.

Here's An Accurate Way To Test Exchanger Tubes

A rapid, accurate, and safe method of testing condenser and heat exchanger tubes is possible with the use of a testing tool supplemented with a backup tool.

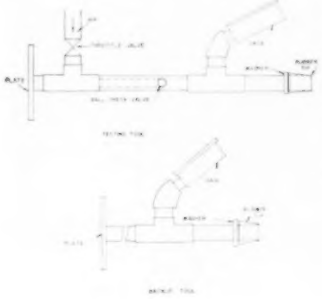
In previous operations, the testing tool alone would be used and the boilermaker's helper would back up the tubes being tested with a plug. Air would be turned into the testing tool, passing into the tube, and pressure recorded on a gage incorporated in the tool.

In this manner, the boilermaker could note any declining pressure on the gage and thereby determine if the tube were leaking. Once the test had been made, the boilermaker would release the pressure on his end and the test would be run on the next tube in sequence.

However, a drawback existed here in that with the usual noise existing in a maintenance shop, the helper, backing up the tube with the plug, would not always know when the pressure had been released. Consequently, whenever he released the plug too soon, rust and scale from the inside of the tube would be blown towards him, constituting a hazard.

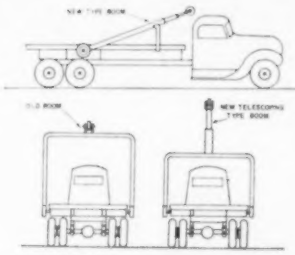
To offset such a situation, the backup tool is similar to the testing tool in that the helper now has a gage to check the pressure on the tube. By noting the gage's actions, he can accurately determine when the pressure has been released by the boilermaker and thus know positivly when it is safe to remove the backup tool. A further use of the backup tool is as a means of obtaining a double check on the tube pressure.

The method is used by Sinclair Refining Co., Houston.



Telescoping-Type Truck Boom Handy Around the Plant

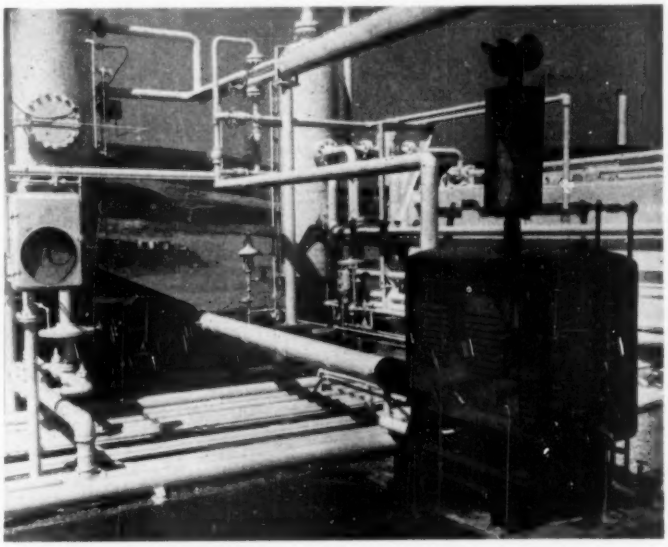
By installing telescoping jibs on U-frame truck booms, it has been possible to back the truck in between steam lines, pumps, and other equipment and hoist heavy equipment directly off its foundation around the plant.



The double arms on the U-frame truck booms are about 6 ft. apart at the top and this would prevent the truck operator from lowering the boom between two closely spaced pieces of equipment to pick up a load. Such a limitation made it necessary to first drag the load out of the unit area with a winch line and then pick it up with the U-frame.

By constructing a jib out of two telescoping sections of heavy pipe, it is now possible to handle the moving jobs in one operation.

The method was suggested by Oliver W. Moore, temporary foreman of motorized equipment at Esso Standard Oil Co.'s Baton Rouge, La., refinery.



Pump Is Shaft Driven As A Safety Measure

This lean-oil pump is shaft driven as a safety measure in case of packing failure. The pump is installed in the absorption-refrigeration natural-gasoline plant of Union Oil Co. near McKittrick, Calif. The absorption oil is the hexane-plus fraction previously recovered in the plant. This low-molecular-weight solvent is much more volatile than conventional absorption oil. Since it is necessary to use a gas engine to drive the pump, the shaft is required to remove the engine a safe distance from the pump.

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VIEW OF VACUUM lift handling large-diameter pipe. Truck boom carries vacuum lift and pipe at the same time.

Vacuum Pipe Lift

Unit now in experimental stage will enable lifting and moving of pipe without damage to coating or wrapping

F. Lawrence Resen

HANDLING of large-diameter joints in pipe-line construction may be improved through use of a newly developed vacuum-lift mechanism.

In its simplest form, the unit, currently in field-experimentation stage, utilizes a vacuum pump driven by a gasoline motor to continuously evacuate a built-in vacuum tank. The unit is set down upon a joint of pipe and the enclosure made between the pipe and the unit is then evacuated.

Once the necessary vacuum is acnieved—a matter of seconds—the unit can then be lifted and the pipe will be held fast by the vacuum seal and moved as desired. A manually operated check valve is used to release the vacuum once the pipe has been moved as desired.

The vacuum-lift mechanism, being developed by Crutcher - Rolfs - Cummings, Inc., Houston, eliminates the need for slings. An important advantage of vacuum lift is the avoidance of injury to the pipe coating.

How it works . . . The vacuum-tank consists essentially of two pieces of rolled steel which are separated by crescent-shaped end pieces. They are welded together to form an air-tight vessel. The underside of the tank is rolled to fit the circumference of the size pipe to be handled by the particular unit; i.e., 16, 20, 30-in., etc. Sections of pipe may be used for this purpose rather than rolling individual pieces from plate steel. The length of the tank varies from 6 to 8 ft., depending on the pipe size. With a 30-in. unit, the arc of pipe covered by the tank is 75° and the area encompassed is approximately 1,900 sq. in.

Rubber seal . . . To provide an effective seal, 1-in.-thick sponge rubber is glued in strips around the periphery of the underside of the tank. Strips of ⅜-in. medium-hard rubber are glued just within the sponge rubber as well as along the centerline of the underside of the tank. The purpose of the medium-hard strips is to absorb impact and protect the surface of the pipe from any immediate contact with the underside of the tank.

It is the actual space between the underside of the tank and the pipe which provides the lifting medium and a small hole connects this space to the vacuum tank.

The gasoline engine and the vacuum pump are mounted on a platform just above the vacuum tank. This platform is supported by pins to provide a small degree of flexibility when the unit is being set down on the pipe. A flexible hose connects the vacuum pump to the tank, and a vacuum gage mounted on the tank and the release valve complete the unit.

Lifted by boom . . . The 500-600-lb. weight of the unit may be lifted by a truck, crane, or tractor boom and set down on the pipe to be moved. Strap-iron guides, welded to the four ends of the vacuum tank, facilitate this operation. The instant the unit is set on the pipe, the evacuation of the lift space begins, and the necessary evacuation is completed in less time than it takes the winch operator to reverse controls. To insure safe movement of the pipe, a vacuum of 20 in. of mercury is attained. This is actually four or five times the vacuum necessary with standard lengths of 30-in. pipe.

In the event the gasoline motor should stall while the pipe is suspended in mid-air, the approximately 4 cu. ft. of the vacuum tank provides enough lifting capacity to allow the operator several minutes in which to lower the pipe to the ground.

The replacement of the sponge-rubber stripping can be made with a mastic cement in about 30 minutes.

The project has been under supervision of Don Foster of C.R.C.

CLOSEUP OF VACUUM LIFT on large-diameter pipe. More vacuum than is actually required is supplied to make sure pipe stays in place while unit and pipe are moved by truck boom.

Float sand turning once-active field . . .

. . . into virtual "graveyard"

C. Malcolm Davis

THESE two photographs tell a graphic story: That the successful production of an oil field is closely related with proper production practices carried on during normal life of the field.

These views were taken in a "thin sand" extension to Goose Creek field, 20 miles east of Houston, and on the edge of Baytown, Tex., in Harris County. Two years ago this particular extension enjoyed a drilling spurt when production was pushed out along the north flank of the field. At one time there were a score of rigs running, punching holes down to the shallow Miocene pay. Today, however, a large number of the extension wells are shut in, or else are eking out a mere dribble compared with original initials.

The "stacked" pumping units, awaiting transport to more prolific locations, and the bare pump platforms and abandoned well heads, are the results of float sand, which is gradually choking the wells off production. The wells have been failing quickly, apparently because operators did not use the gravel packing or other sand-exclusion techniques in completing their wells. In some instances, however, fine screen was used to stop the float-sand inroads.

COMPRESSOR CALCULATIONS—3

Correlating Specific-Heat Data

by R. W. Brooks*

GENERALIZED charts for natural gases are presented in this installment. Fig. 1 is applicable to all natural gases. The uncorrected ratio of Cp/Cv may be read from Fig. 2 within a maximum error of 3 per cent so long as the specific gravity falls between 0.60 and 0.70 for a straight hydrocarbon gas, or between 0.65 and 0.70 for gases containing as much as 10 per cent N_2. Where the natural gas in question does not fall within these ranges, or where greater accuracy is desired, multiply by the correction factor shown in conjunction with Fig. 2 to obtain the correct k value.

Figs. 3 and 4 have been calculated for a typical gas of 0.68 specific gravity, 1,075 B.t.u. per cubic foot heat value, and containing 8 per cent N_2. These curves show clearly the effect of pressure and temperature on Cp and Cp/Cv values. Paths of isentropic compression have been shown on Fig. 4 by dotted lines. It can be noted that the k value does change during compression, particularly when the compression starts at a low suction pressure. Proceeding from suction pressure and temperature along an isentropic guide line to the discharge pressure, the discharge temperature may be determined directly. The final temperature may be calculated, if de-

*Pacific Gas & Electric Co. From paper presented at Pacific Coast Gas Association technical conference, Los Angeles, 1953.

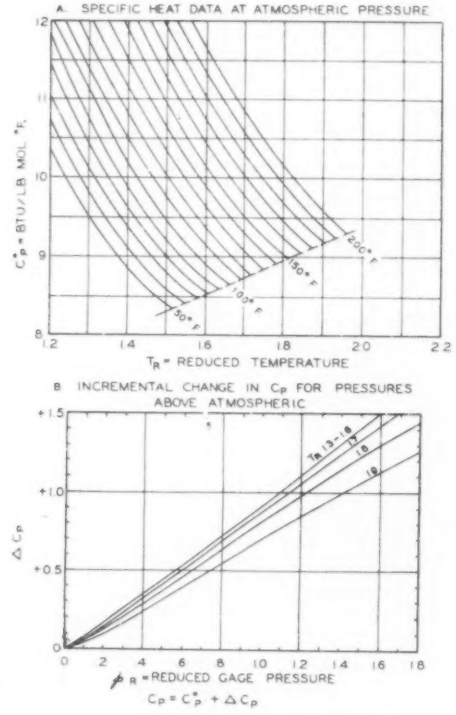

A. SPECIFIC HEAT DATA AT ATMOSPHERIC PRESSURE
C_p° = BTU/LB MOL °F.
T_R = REDUCED TEMPERATURE
B. INCREMENTAL CHANGE IN Cp FOR PRESSURES ABOVE ATMOSPHERIC
ΔCp
p_R = REDUCED GAGE PRESSURE
$C_p = C_p^\circ + \Delta C_p$

Fig. 1—Generalized Cp data for natural gas.

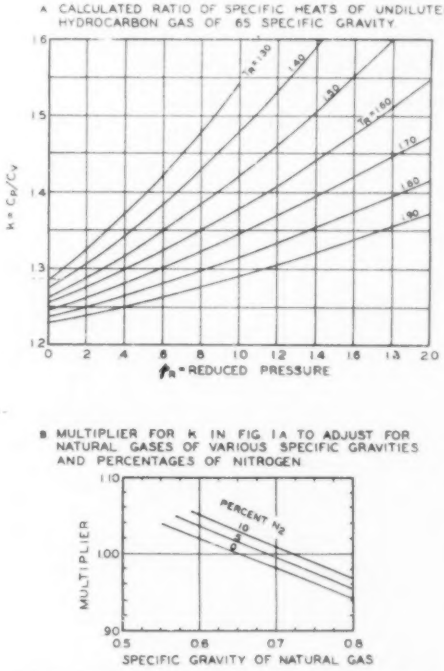

A CALCULATED RATIO OF SPECIFIC HEATS OF UNDILUTED HYDROCARBON GAS OF 65 SPECIFIC GRAVITY
k = Cp/Cv
p_R = REDUCED PRESSURE
B MULTIPLIER FOR K IN FIG. 1A TO ADJUST FOR NATURAL GASES OF VARIOUS SPECIFIC GRAVITIES AND PERCENTAGES OF NITROGEN
MULTIPLIER
PERCENT N_2
SPECIFIC GRAVITY OF NATURAL GAS

Fig. 2—Generalized specific heat ratio data for natural gas.

sired, by estimating an average k and using:

$$\frac{T_2}{T_1} = \left(\frac{P_2}{P_1}\right)^{\frac{k-1}{k}}$$

Edmister and McGarry[1] suggest using in place of $(k-1)/k$ the value of:

$$\frac{R\left[Z + T_R\left(\frac{\partial Z}{\partial T_R}\right)_{P_R}\right]}{C_P}$$

and Owen[2] recommends using the equation:

$$\frac{T_2}{T_1} = \left[\frac{P_2 Z_1}{P_1 Z_2}\right]^{\frac{n-1}{n}}$$

where n is his adjusted k value.

Table 1 has been set up to compare actual test data with values calculated by the Edmister and McGarry method and the method outlined in this paper.

Discharge temperatures calculated from Owen's method are not shown since the results determined for several cases were found to be similar to those obtained from the formula proposed herein when based on the Z and initial k data. The calculation of average exponents for Owen's or Edmister and McGarry's methods require trial and error solutions. It is to be expected that calculated values of discharge temperature will run somewhat higher than the observed data which were measured in the header piping systems.

Although some compressor cylinders were water jacketed (low circulation to eliminate hot spots only), some oil jacketed (oil not circulated) and others air cooled, the observations did not vary appreciably. Pressures and temperatures were read from recorded data. The agreement between the observed temperatures and those calculated from k values given on Figs. 2 and 4 is sufficiently good to warrant the use of the k values.

References

1. Edmister, W. C., and McGarry, R. J., Chem. Eng. Progress 45, p. 421 (1949) July.
2. Owen, H. C., Jr., The Oil and Gas Journal, 48, p. 112 (1949) October 20.

TABLE 1—DISCHARGE TEMPERATURE, OBSERVED AND CALCULATED

	Observed data					Calculated discharge temp.	
	Pressure, psig.			Temp., °F.			
	Suction p_s	Discharge p_d	Ratio P_2/P_1	Suction t_s	Discharge t_d	Proposed method t_d	Edmister and McGarry t_d
Topeck	567	725	1.272	89	126	127	119
	402	718	1.746	89	168	173	156
	568	718	1.257	66	100	102	95
	460	730	1.570	81	147	150	135
Hinkley	470	700	1.474	52	111	112	100
	498	696	1.385	53	104	104	93
	498	710	1.413	53	105	107	95
	433	745	1.70	73	148	155	138
Kettleman	320	565	1.732	76	157	156	142
	475	641	1.339	75	120	120	110
	426	639	1.483	68	128	128	116
	430	640	1.475	71	130	132	119
Potrero*				63.5	234	236	233
				67	253	260	255

*Water was circulated through compressor cylinder jackets during Potrero tests.

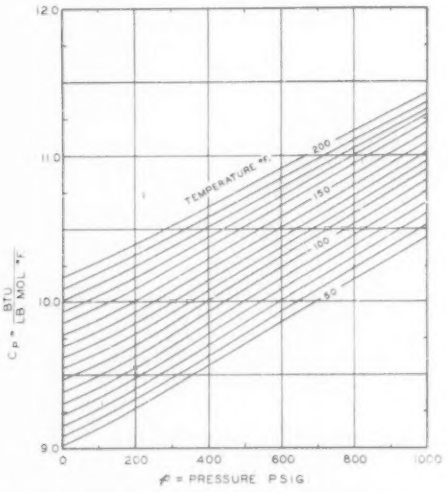


Fig. 3—Calculated data for 0.68 specific gravity natural gas, 1,075 B.t.u. and 8 per cent N_2.

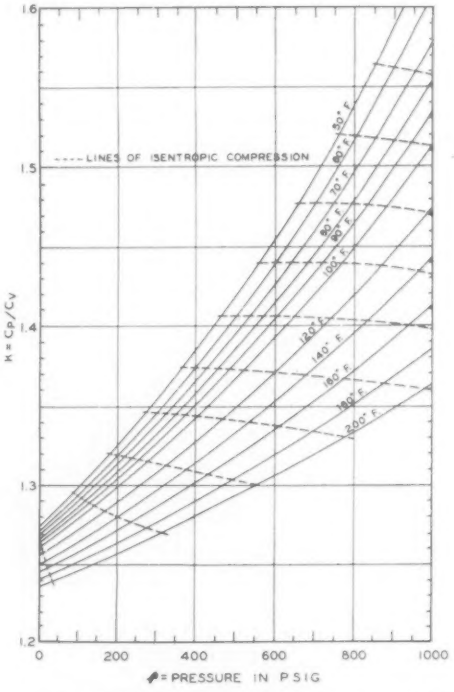


Fig. 4—Calculated ratio of specific heats for natural gas of 0.68 specific gravity, 1,075 B.t.u. and 8 per cent N_2.

Pressure-Rate Alarms

by Porter Hart* and R. C. King†

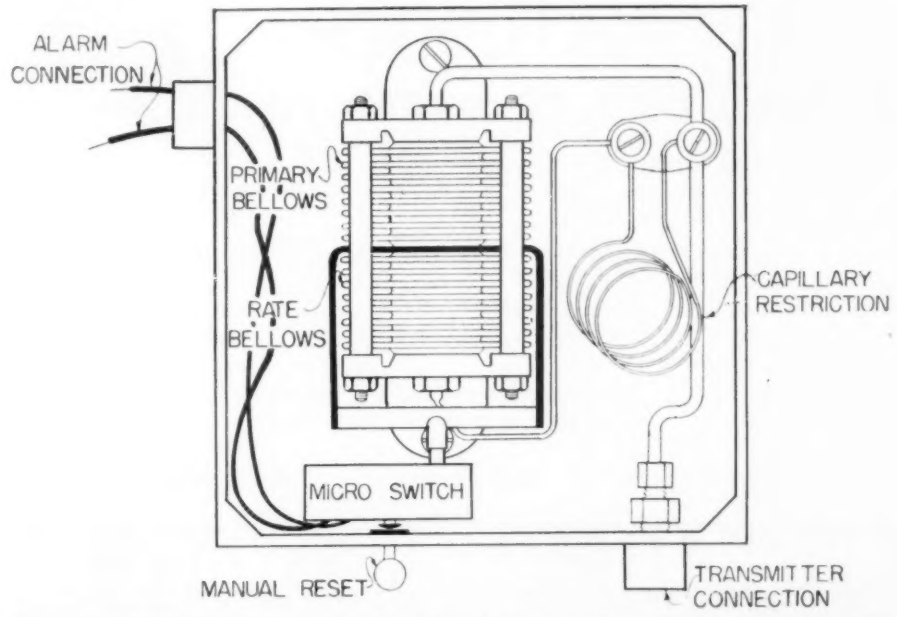
IN some reaction systems, a sudden change indicates a dangerous condition. This change may occur over a range of operating conditions so a pressure-alarm switch on the transmitter output cannot be used to give warning of the sudden change.

A pressure switch incorporating a rate action feature to operate over the full range of the output of a standard pneumatic transmitter, as shown in Fig. 1, was built for this service. It was made from a standard bellows subassembly from a proportional with reset controller. A connection from the floating arm was made to actuate a Micro switch when the pressure in the upper bellows increased a definite amount over that of the lower bellows. A bleed in the form of a capillary restriction was installed between the two bellows. This bleed is adjusted to the operating conditions of the process.

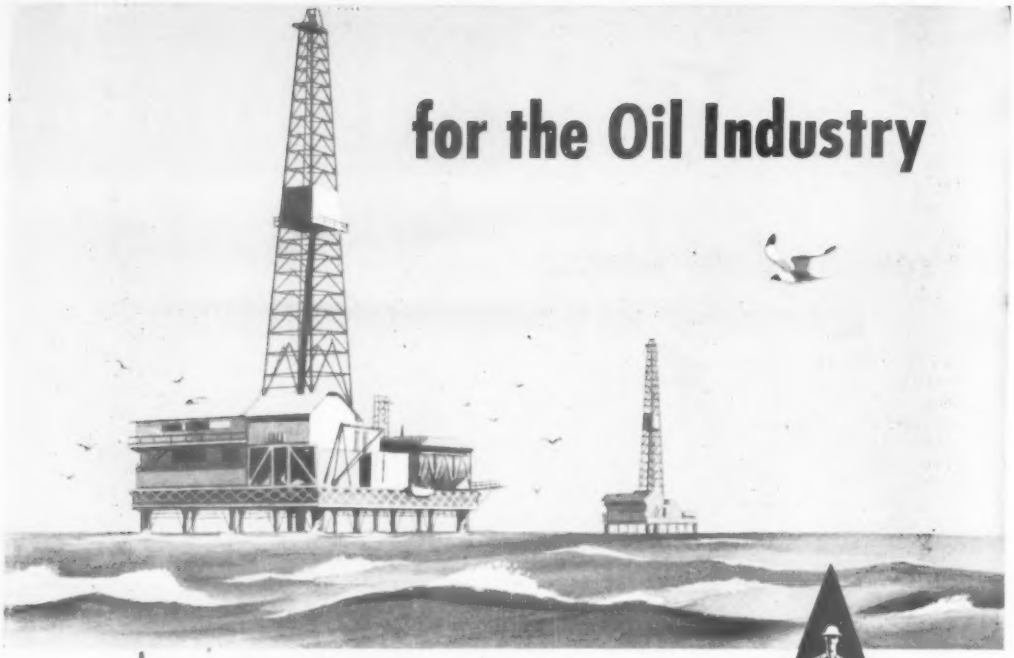
The air pressure from the transmitter is connected directly to the upper bellows and through the bleed restriction to the lower bellows; thus, a gradual pressure change such as is normally encountered will affect both bellows almost simultaneously, causing little movement of the floating arm. A sudden pressure increase from the transmitter will force the floating arm downward, closing the Micro switch and actuating the alarm. The Micro switch is of the manual reset type so that the alarm is energized until a button is pushed to reset the alarm system. This gives the operator sufficient time to detect the source of the trouble and correct it.

This system has operated very satisfactorily on the type of installation described. The whole assembly is quite compact and is mounted in a standard cast-iron junction box.

* Superintendent, Instrumentation, and † assistant superintendent, Instrumentation, Dow Chemical Co., Freeport, Tex. Presented at symposium on Instrumentation for the Process Industries, A. & M. College of Texas, 1953.



RATE-ACTION PRESSURE ALARM is used to indicate sudden changes in operating conditions in reaction systems where these conditions are critical. Fig. 1.



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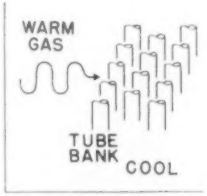
Part 33 of a series

by Dr. B. E. Lauer, Head, Department of Chemical Engineering, University of Colorado

h_f HEAT TRANSFER

COEFFICIENT of HEAT TRANSFER through FILM between OUTSIDE SURFACE of BANK of COOL TUBES and a WARM GAS



Tube Position: Vertical

Tube Arrangement: Staggered

Gas Movement: Turbulent

Direction of Movement: Normal to tube.

EQUATION:

$$h_f = 0.33 \frac{K}{D_o}\left[\frac{D_o V_{max}\rho}{\mu}\right]^{0.6}\left[\frac{C_p \mu}{K}\right]^{0.33}$$

TERMINOLOGY:

h_f - Coefficient of heat transfer, BTU/ft.^{2} hr. $^\circ$F.

D_o - Outside diameter of tube, ft.

K - Thermal conductivity of gas at t_f, BTU/ft. hr. $^\circ$F.

V_{max} Maximum velocity of gas through free space between front bank of tubes, ft./hr.

ρ - Density of gas at t_f, lbs./ft.^{3}

μ - Absolute viscosity of gas at t_f, lbs./hr. ft.

C_p - Specific heat of gas at t_f, BTU/lb.$^\circ$F.

t_f - Film temperature = 1/2 sum of outer wall temperature and main body temperature.

LIMITATIONS: The Reynolds number $(D_o V_{max}\rho/\mu)$ must be over 2000.

Equation above for data taken on bank of tubes 10 rows deep. For shallower tube banks $h_{f(corr)} = h_{f(calc)} \times$ correction factor as follows:

Rows	Factor	Rows	Factor	Rows	Factor
2	0.73	3	0.82	4	0.88
5	0.91	6	0.94	7	0.96
8	0.98	9	0.99	10	1.0

SIMPLIFIED EQUATION:

$$h_f = 0.135 \frac{C_p (V_{max}\rho)^{0.6}}{D_o^{0.4}}$$

SOURCES OF DATA: For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry (1948).

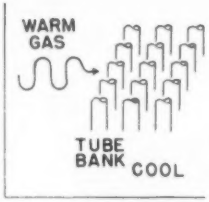
for ρ -- see pp. 130-148, 175-195, 1683.
μ -- see pp. 370-374, 1198, 1696.
K -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-235, 297, 1588, 1696.

REFERENCES:

1. Heat Transmission, William H. McAdams, pp. 228-229.
2. Elements of Heat Transfer and Insulation, Jakob & Hawkins, pp. 115.
3. Introduction to the Transfer of Heat and Mass, Eckert, pp. 114-145.
4. Mechanical Engineers' Handbook, Lionel S. Marks, Fourth Edition, p. 906.

K 1 c (1)

COEFFICIENT of HEAT TRANSFER through FILM between OUTSIDE SURFACE of BANK of COOL TUBES and a WARM GAS



Tube Position: Vertical

Tube Arrangement: In line

Gas Movement: Turbulent

Direction of Movement: Normal to tubes.

EQUATION:

$$h_f = 0.26 \frac{k}{D_o}\left[\frac{D_o V_{max}\rho}{\mu}\right]^{0.6}\left[\frac{C_p \mu}{k}\right]^{0.33}$$

TERMINOLOGY:

h_f - Coefficient of heat transfer, BTU/ft.^{2} hr. $^\circ$F.

D_o - Outside diameter of tube, ft.

k - Thermal conductivity of gas at t_f, BTU/ft. hr. $^\circ$F.

V_{max} Maximum velocity of gas through free space between front bank of tubes, ft./hr.

ρ - Density of gas at t_f, lbs./ft.^{3}

μ - Absolute viscosity of gas at t_f, lbs./hr. ft.

C_p - Specific heat of gas at t_f, BTU/lb.$^\circ$F.

t_f - Film temperature = 1/2 sum of outer wall temperature and main body temperature.

LIMITATIONS: The Reynolds number $(D_o V_{max}\rho/\mu)$ must be over 2000.

Equation above for data taken on bank of tubes 10 rows deep. For shallower tube banks $h_{f(corr)} = h_{f(calc)} \times$ correction factor as follows:

Rows	Factor	Rows	Factor	Rows	Factor	Rows	Factor
1	0.64	2	0.80	3	0.87	4	0.90
5	0.92	6	0.94	7	0.96	8	0.98
9	0.99	10	1.0				

SIMPLIFIED EQUATION:

$$h_f = 0.106 \frac{C_p (V_{max}\rho)^{0.6}}{D_o^{0.4}}$$

SOURCES OF DATA: For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry (1948).

for ρ -- see pp. 130-148, 175-195, 1683.
μ -- see pp. 370-374, 1198, 1696.
k -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-235, 297, 1588, 1696.

REFERENCES:

1. Heat Transmission, William H. McAdams, pp. 228-229.
2. Elements of Heat Transfer and Insulation, Jakob & Hawkins, p. 115.
3. Introduction to the Transfer of Heat & Mass, Eckert, pp. 114-145.

K 1 c (2)

COEFFICIENT of HEAT TRANSFER through FILM between OUTSIDE SURFACE of BANK of COOL TUBES and a WARM LIQUID

Tube Position: Vertical

Tube Arrangement: Staggered

Liquid Movement: Turbulent

Direction of Movement: Normal to tube.

EQUATION:

$$h_f = 0.33 \frac{k}{D_o}\left[\frac{D_o V_{max}\rho}{\mu}\right]^{0.6}\left[\frac{C \mu}{k}\right]^{0.33}$$

TERMINOLOGY:

h_f - Coefficient of heat transfer, BTU/ft.^{2} hr. $^\circ$F.

D_o - Outside diameter of tube, ft.

k - Thermal conductivity of liquid at t_f, BTU/ft. hr. $^\circ$F.

V_{max} Maximum velocity of liquid through free space between front bank of tubes, ft./hr.

ρ - Density of liquid at t_f, lbs./ft.^{3}

μ - Absolute viscosity of liquid at t_f, lbs./hr. ft.

C - Specific heat of liquid at t_f, BTU/lb.$^\circ$F.

t_f - Film temperature = 1/2 sum of outer wall temperature and main body temperature.

LIMITATIONS: The Reynolds number $(DV_{max}\rho/\mu)$ must be over 2000.

Equation above for data taken on bank of tubes 10 rows deep. For shallower tube banks $h_{f(corr)} = h_{f(calc)} \times$ correction factor as follows:

Rows	Factor	Rows	Factor	Rows	Factor
2	0.73	3	0.82	4	0.88
5	0.91	6	0.94	7	0.96
8	0.98	9	0.99	10	1.0

h_f, calculated for banks of tubes in baffled heat exchangers should be multiplied by 0.6 to provide for leakage around the baffles.

SIMPLIFIED EQUATION:

for water $$h_f = 370(1+0.0067 t_f)\frac{(V_{max}/3600)^{0.6}}{(12 D_o)^{0.4}}$$

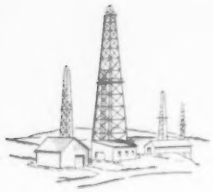
PHYSICAL CONSTANTS: See Chemical Engineers' Handbook - J. H. Perry (1948).

for ρ -- see pp. 130-148, 175-195, 1683.
μ -- see pp. 370-374, 1198, 1696.
K -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-235, 297, 1588, 1696.

REFERENCES:

1. Heat Transmission, William H. McAdams, pp. 228-229.
2. Elements of Heat Transfer and Insulation, Jakob & Hawkins, p. 115.
3. Introduction to the Transfer of Heat & Mass, Eckert, pp. 114-145.

K 2 c (1)



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Kennametal sintered-carbide Balls and Seats retain bottom hole valving efficiency due to their extreme "diamond-like" hardness. Their wear and corrosive resistance provide unexcelled performance in sand, sour crude, hydrogen sulphides, water and gas cut fluids.

Consider that a single round tripping of string costs many times more than the highest-priced or largest Kennametal Ball and Seat. For this reason, many fields are standardizing on Kennametal. Also, it is for this reason that they are incorporated in most leading pumps as standard equipment. A complete line of Kennametal API sintered carbide Balls and Seats (in both plain and rib styles) is available from your supplier.

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QUESTIONS ON TECHNOLOGY

by W. L. Nelson
Technical Editor

Sour Crude-Oil Fields

What crude oils are classified as sour? Where can we find a list of them? S.P.C.

Scarcely any classifications of crude oils from the standpoint of "sourness" or "sweetness" have been published. Perhaps the best source of classification are the posted price schedules of crude oils such as those published in Platt's Oil Price Handbook.[1] This indicates most of the sour crude oils that are listed in Table 1 herein. A few other names or areas are mentioned in the literature shown in the references herein.

In addition to "sour" crude oils, namely those that contain 0.05 cu. ft. of dissolved hydrogen sulfide per 100 gal. of crude oil,[2] many crude oils are classified as "high-sulfur" crude oils. These are not troublesome in field tanks, pipe lines, storage terminals, or in the topping plants of refineries but they contain "potential" hydrogen sulfide, meaning that upon heating to 400° F. or higher, hydrogen sulfide is liberated. It is interesting to note that certain high-sulfur crude oils such as those from Mexico, California, and Venezuela are never referred to as sour crude oils. However, it is necessary to stabilize some of the Middle East oils (Abqaiq[3]) to remove hydrogen sulfide before they are classified as sweet.

Table 1—Some Sour Crude-Oil or Gas Fields in the U. S.

Texas:
Panhandle area.
North Texas field: (a few oils).
Gulf Coast field: Sugarland.
Andrews County fields: Parker, Fullerton, Embar, Fuhrman, Means, Emma.
Cochran County fields: Landon, Landon Bend.
Coke County field: Wendland.
Concho County fields: Pfluger, Eden.
Crane County fields: Cowden, McElroy, Sand Hills, Jordan, Dune, Cordona Lake, Gib, Crossett, Leck.
Crockett County fields: Cox, Clara Couch, Hoover, Simpson, Olson, Vaughn, Rhodes, World-Powell, Shannon, Wyatt, Duggan, World.
Dawson County field: Welch.
Ector County fields: North Cowden, Penwell, Goldsmith, Addis, TXL, Foster.
Floyd County.
Gaines County fields: Jenkins, Robertson, Seminole, Russell N.
Garza County fields: Spur, P.H.D.
Glasscock County fields: Garden City, Chalk.
Hale County fields: Peterburg, Irish.
Hockley County fields: Levelland, Smyer, Slaughter.
Howard County fields: Howard-Glasscock, Moore, Morita, Vincent, Iatan, Snyder, Henshaw.
Irion County field: Tankersley.
Lamb County.
Loving County fields: Wheat, Mason.
Midland County field: Midland S.
Mitchell County fields: Coleman Ranch, Iatan, Sharon Ridge, Westbrook.
Pecos County fields: Jamison-Pollard, Abell, Oates, Chancellor, Richards, Heiner N., Toborg, TCL-Waddell, Masterson, Yates, Pecos Valley, Shearer, Taylor Link, Walker, Wentz.
Reagan County field: Block 31 (Univ.).
Reeves County fields: Dixiland, Toyah, Chapman, Tunstill.
Schleicher County fields: Baugh, Tankersley.
Sterling County field: Spade.
Sutton County field: Brushy Top.
Terry County field: Mound Lake.
Upton County fields: McCamey, Webb-Ray, Crossett, McElroy.
Ward County fields: Magnolia-Sealy, Monohans, Pyote, Shipley, North Ward, Lion, Monroe, Payton, Sealy Yates.
Winkler County fields: Eaves, Emperor, Henderson, Hendrick, Wasson, Halley, Keystone, Scarborough, Kermit, Wink, Leck.
Yoakum County field: Wasson.

New Mexico:
Lea County fields: Langlie-Mattix, Cooper-Jal, Eunice, Monument, Penrose-Skelly-Drinkard.
Eddy County.
Chavis County.

Ohio:
Kenton field.

Kentucky:
Glasgow field.

Arkansas:
Fields: Magnolia, Dorcheat-Macedonia, Schuler, Mars Hill, McKamie, Atlanta, Patton, Buchner, Big Creek, Cairo, Calhoun, Village, Columbia, Schuler-Jones.

Wyoming:
Fields: Elk Basin, Silver Tip, Byron Basin, Garland, Oregon Basin, Worland, Neibar Dome, Beaver Creek, Big Sand Draw, Riverton, South Baxter Basin, Frannie.

Michigan:
Wisner sour field.

Kansas:
(Some central or western fields).

References

1. Platt's Oil Price Handbook, Platt's Price Service, Inc., Cleveland, published yearly.
2. Creele, W. H., "Controlling Corrosion . . . Sour Crudes," The Oil and Gas Journal, Oct. 20, 1945, p. 132. Panhandle crudes are discussed.
3. Trusty, A. W., "What Can Be Done About Sulfur," Pet. Engineer, May 1942, p. 72. Several sour gas fields are listed.
4. Pierce, et al., "Processing Sour Crude," The Oil and Gas Journal, Sept. 30, 1946, p. 96.
5. Esbach, R. H., "Sources of Hydrogen Sulfide in Wyoming," Ind. Eng. Chem. 42, 2235, November 1950. Lists many gas fields that are in contact with oil.
6. Cunningham, W. A., "Hydrogen Sulfide in West Texas," Ind. Eng. Chem. 42, 2238, November 1950. Lists many gas fields and counties.
7. Private communications from large purchasers.
8. Black, R. W., (Esso Standard Oil Co.) "Gas Freeing Tanks . . . Air Movers vs. Steaming," Pet. Refiner, December 1948, p. 139, or Esso Safety Department publication, "Safety Instructions for Preventing Accidents and Personal Injury."
9. Anon., "Aramco's New Field Has Big Sweet Crude Yield," Oil Forum, May 1949, p. 201.

Viscosity Slide Rule

"Are there slide rule type calculators or simple equations available which will enable one to obtain the following data on lubricating oils:

"1. Viscosity at 0° F. from viscosities at 100° and 210° F.

"2. Per cent of light and heavy-base oils to be used in a blend.

"Such methods would greatly speed up calculations and eliminate the cumbersome A.S.T.M. Standard Charts." D.J.A.

Such a slide rule was marketed at one time in Germany but recent inquiries by this department have failed in locating a manufacturer. The German rule permitted the determination of viscosity at any temperature (from viscosities at two temperatures), the viscosity index, and the amounts of components to use in blends.

Although such a rule would be useful, it could not be exact, and the somewhat small sale of such a rule would discourage manufacturers.

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After exhaustive field tests our newest rotary drilling rig is being shown for the first time at the Tulsa Oil Show. This new Model 3000 is designed to drill to 4000 feet with 3½-inch drill pipe; 3000 feet with 4½-inch drill pipe; and up to 7000 feet in workover. Mounted on a tandem axle, dual wheel semi-trailer, the Model 3000 is completely portable. Under actual operational conditions it has been set up and drilling started for surface casing in less than 60 minutes. The 87-foot mast of seamless steel tubing construction is raised or lowered by two triple telescoping hydraulic cylinders. A wide range of power units is available driving through either power take-off or a torque converter. If you can't see this newest Mayhew-engineered, Mayhew-designed rig, write or wire for complete specifications.

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DALLAS MAYHEW TEXAS

It Pays to Be Gentle With Rotary Hose

by H. (Barney) Barnard*

THE care and maintenance of rotary hose cannot be regarded too lightly. A rotary hose is the most ungainly piece of equipment on a drilling rig. It can't be handled properly by hand, yet if mechanical methods are used the hose can be ruined on the first installation.

Recommendations . . . If followed closely these recommendations will add materially to the service of your hose:

1. Installation: Hose is delivered to the lease coiled in cases varying in sizes. There are two approaches as to the removal of this hose, but fundamentally hose should be strung out straight by hand, the cat line hooked to the standpipe and the hose hoisted to the standpipe connection; make the connection first and then do the same at the swivel, start the pumps and if the hose shows any distortion knock your wing nut loose at the swivel and tighten again after torsional twist has been removed.

2. Length: Without going into slide rules and technical data and equations, see that your standpipe is not less than 7 ft. nor more than 10 ft. shorter than your hose—this will give you sufficient hose either up or down—taking into consideration kelly cocks, bushings, etc.

3. Pressure: Unless a hose is defective, which will show up under pressure almost immediately, it is impossible to have a hose fail while drilling under normal drilling pressures. Therefore, the chances are that something happened while moving the hose from one location to another.

*President, Goodall Rubber Co. of Texas.

Moving . . . The importance of the moving procedure of a hose cannot be overly stressed. Hose should not be coiled in less than a 72-in. radius and tied with soft lines at the two ends and through the middle, boom on the truck, and if possible, move it separately from other equipment. If this is not convenient see that the hose is not subjected to damage by heavy equipment contact. If hose is moved in a basket or cradle or any container it is suggested to remove hose by hand, straighten out, and use cat line for mechanical power.

Unless the above mentioned container rotates it is perilous to attach cat line while hose is in container. If the container rotates the hose will rotate normally and eliminate any hazard of torsional twist. This torsional twist is the cause of a good percentage of hose failures.

Rotating drum . . . A skid-mounted rotating drum may be easily constructed which will provide a safe, secure place for the hose during moving operations thereby eliminating damage to the hose which might easily be incurred.

Base of the rack consists of three skids, arranged parallel to each other, which are welded to two lengths of pipe at each end in such a fashion as to form a rectangular platform. The skids are 10 ft. long, and are arranged approximately 3 ft. apart so that the width of the platform is 6 ft.

The drum is constructed of sheet metal 3 ft. wide which is formed into a circular drum with a diameter of 5 ft. The bottom of the drum is covered over with circular plate steel about 6½ ft. in diameter which provides a resting place for the rotary hose on the outside of the drum and also a bin within the drum for carrying small tools and pieces of equipment.

The entire drum is secured on the skids so that its weight is supported by four roller bearings mounted at 90° intervals on the skids. The hose platform, or lower portion of the drum assembly, rides on the bearings and thus the entire assembly may be rotated whenever the hose is removed from the drum. Two-inch strap iron is welded to the rim of the platform, and "eyes" are welded to this rim as well as to the skids, so that double hooks may be used to secure drum to prevent its rotating in transit. In addition, two lengths of 1½-in. pipe extends horizontally over the top of the drum to prevent the hose from working upward once it has been placed on the drum.

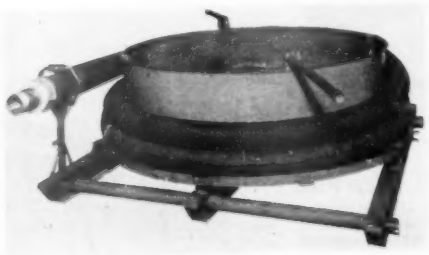
A roller guide completes the unit, which guide is mounted at the end of one of the outermost skids. Four wooden rollers are mounted on the guides and hold the standpipe end of the rotary steady as well as to allow the hose to slip easily through the guide when being coiled or uncoiled.

Points to remember:

Proper hookup.

Proper length of standpipe.

Proper handling of hose during moves.



SKID-MOUNTED ROTATING DRUM provides safe place for rubber rotary hose during rig moving operations.

See you at the Oil Show!

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You'll find the Bethlehem building right in the heart of the show grounds—same location we had in '48. The present exhibit is brand-new, colorful, and modern as today. You'll see in action the latest drilling equipment and pumping units . . . and fine displays of wire rope, sucker rods, fastenings, pipe, and forgings. There will also be a section devoted to drilling barges and other types of oil-country vessels. We hope you'll take your time, enjoy it all, and ask a million questions.

Representatives of Bethlehem Steel Export Corporation, with its world-wide coverage, will be on hand to assist all foreign visitors.

Remember, it's a date. Look us up as soon as you reach the show!

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EQUIPMENT MEN . . . in the News

Three Totco Personnel Named to Executive Posts

J. B. WOOD

The board of directors of Technical Oil Tool Corp. has announced the election of J. B. Wood, former president of the corporation, to the newly created position of chairman of the board. To fill the presidency, the board has named H. H. (Pete) Peters, former vice president. E. G. McConnell, Mid-Continent manager, was named vice president in charge of the Mid-Continent.

Wood organized Totco in 1930 and has headed the company since that time.

Peters started with Totco in 1936, and he has served successively in the field as a sales representative in the Rocky Mountain, West Texas, New Mexico and California area. He was elected to the vice presidency in 1946.

H. H. PETERS

McCONNELL

McConnell joined the company in 1935, when Totco was first introduced in the Mid-Continent. He pioneered the introduction in Oklahoma, Louisiana, and the Texas Gulf Coast. McConnell has been Mid-Continent manager since 1938.

Curtiss-Wright Introduces Rotary Oil Pump to Industry

Introduction of a new heavy-duty, high-pressure oil pump, marking the entry of Curtiss-Wright Corp. into the petroleum industrial-equipment-manufacturing field, was announced recently by Roy T. Hurley, chairman and president of the company.

The new pump, which will be produced by Marquette Metal Products Co., Cleveland, a Curtiss-Wright subsidiary, has been field tested and approved by several leading oil companies for crude-oil-gathering service and product pipe lines. Its general industrial potential for pumping petroleum products and liquids is indicated by its use by leading government and private research laboratories.

Of the rotary positive-displacement type, the new pump is extremely compact in design and is reversible. The Marquette division, which will produce this Curtiss-Wright product, is a leading manufacturer of precision clutches and diesel-engine governors.

Baker Sales, Service Holds Sales Meetings

Annual sales meeting for branch managers of Baker Oil Tools, Inc.'s, Texas-Gulf district was recently held in Houston. In attendance were, front row: B. O. Ellington, division sales engineer, Houston; C. A. Greve, division staff engineer, Houston; O. H. Menke, branch manager, Lake Charles, La.; P. E. Hilton, division manager, Sales and Service, central division; R. W. Henderson, vice president and assistant general manager; R. D. McBrian, assistant division manager, Sales and Service, central division; N. H. Lytton, district manager, Southwest Texas district; J. P. Wilkerson, branch manager, McAllen, Tex., and H. L. Applewhite, branch manager, Houston. Back row: G. A. Sullivant, district manager, Texas-Gulf district; G. F. Turner, district manager, Louisiana-Gulf district; J. C. Burtner, division staff engineer, Houston; M. C. Muckleroy, branch manager, Corpus Christi, Tex.; D. C. Lewis, branch manager, El Campo, Tex.; J. F. McGuffin, branch manager, Luling, Tex.; R. A. Toney, branch manager, Beaumont, Tex.; H. P. Edwards, branch manager, Falfurrias, Tex.; J. N. Berry, branch manager, Victoria, Tex., and R. W. Jones, branch manager, Freer, Tex.

Baker Oil Tools, Inc., held its annual district sales meeting in Oklahoma City for branch managers in the Mid-Continent district. Present were, front row: E. F. Hannon, Jr., district manager, Mid-Continent district; R. D. McBrian; P. E. Hilton; R. W. Henderson, vice president and assistant general manager; R. C. Glover, foreign and domestic sales engineer, Tulsa; C. C. Taylor, district manager, West Texas district; G. W. Mitchell, subdistrict manager, Great Bend, Kans. Center row: R. C. Finley, branch manager, Hill City; L. E. Walker, Jr., branch manager, Gainesville, Tex.; W. C. Wilson, division sales engineer, Wichita Falls; R. F. Walker, branch manager, Duncan, Okla.; and W. R. Gamble, branch manager, Hominy, Okla. Back row: D. A. Stuart, branch manager, Pampa, Tex.; B. H. Jones, branch manager, Elk City, Okla.; K. E. Hawkins, branch manager, Oklahoma City; E. M. Solter, branch manager, El Dorado, Kans.; F. J. Field, branch manager, Great Bend, Kans.; T. J. Singley, branch manager, Olney; W. W. Farrar, branch manager, Wichita Falls; G. E. Diggs, division staff engineer, Oklahoma City, and C. J. Berlin, division sales engineer, Dallas.

(Continued on page 151)

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Size
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Finish

Seamless and Weldless, Larkin Bull Plugs and Swage Nipples provide uniform dependability wherever they may be used.

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See Our Exhibit at International Petroleum Exposition Oklahoma Bldg.—Booths 50 and 51—May 14-23, Tulsa.

At the Baker sales meeting for Louisiana-Gulf and Ark-La-Tex districts in New Orleans were, front row: R. S. Bedillion, district manager, Ark-La-Tex district; P. E. Hilton; R. W. Henderson; R. D. McBrian, and G. E. Turner, district manager, Louisiana-Gulf district. Back row: M. A. Matthews, branch manager, Magnolia, Ark.; L. L. Bogle, district sales engineer, Harvey, La.; G. A. Sullivant, district manager, Texas-Gulf district; C. J. Taylor, division sales engineer; G. M. Biggs, branch manager, Natchez, Miss.; H. C. Welch, branch manager, Laurel, Miss.; P. H. Galbraith, branch manager, Houma, La.; J. L. Chronister, branch manager, Lafayette, La.; W. P. Donnelly, branch manager, Kilgore, Tex.; P. G. Honeycutt, branch manager, Harvey; S. O. Timmons, branch manager, Palestine, Tex., and M. P. Taylor, branch manager, Shreveport.

At the Baker district sales meeting in Odessa, Tex., were, front row: E. F. Hannon, Jr., district manager, Mid-Continent district; R. D. McBrian; P. E. Hilton; R. W. Henderson; C. C. Taylor, district manager, West Texas district. Back row: J. Edwards, sales engineer, Odessa; J. T. Brian, branch manager, Abilene, Tex.; W. F. Noxon, branch manager, Hobbs; M. R. Litchfield, branch manager, Levelland, Tex.; J. T. Mitchell, branch manager, Odessa; J. F. Holcomb, branch manager, Snyder, Tex.; W. O. Manry, branch sales engineer, Odessa, and J. V. Bergman, branch manager, Farmington.

National Appoints Woods, Stubble Division Managers

J. C. Woods has been appointed division sales manager, and C. J. Stubble division tubular manager of the eastern division of The National Supply Co. Both men have served as assistant managers of that division since 1950.

Woods has been associated with the petroleum industry since 1926. He joined National Supply in 1944 at Fort Worth, and also served at Houston. In addition to his new duties, Woods will handle special sales activities in Chicago, St. Louis, Findlay, and Cleveland, pending a reallocation of those responsibilities.

J. C. WOODS

C. J. STUBBLE

Stubble joined National Supply in 1934 as a clerk in the store at Bolivar, N. Y. He was promoted successively to store manager, district manager, and assistant division manager. In addition to his new responsibilities, Stubble will supervise sales of well-head equipment, manufactured by the company's Houston plant.

Dimmick Is Made Chairman Nomads National Regents

Nomads National Board of Regents has recently named Opie Dimmick chairman, and R. E. Kirberger as secretary-treasurer for 1953. Both men are national regents and members of the Tulsa Chapter.

OPIE DIMMICK

R. E. KIRBERGER

Dimmick is president and chairman of the board of Century Geophysical Corp., and is an immediate past president of Tulsa Chapter of Nomads. Kirberger is sales manager of Unit Rig & Equipment Co.

Control Engineering Holds First General Sales Meeting

The national sales representatives of Control Engineering Corp., Norwood, Mass., met recently in New York for the company's first general sales meeting.

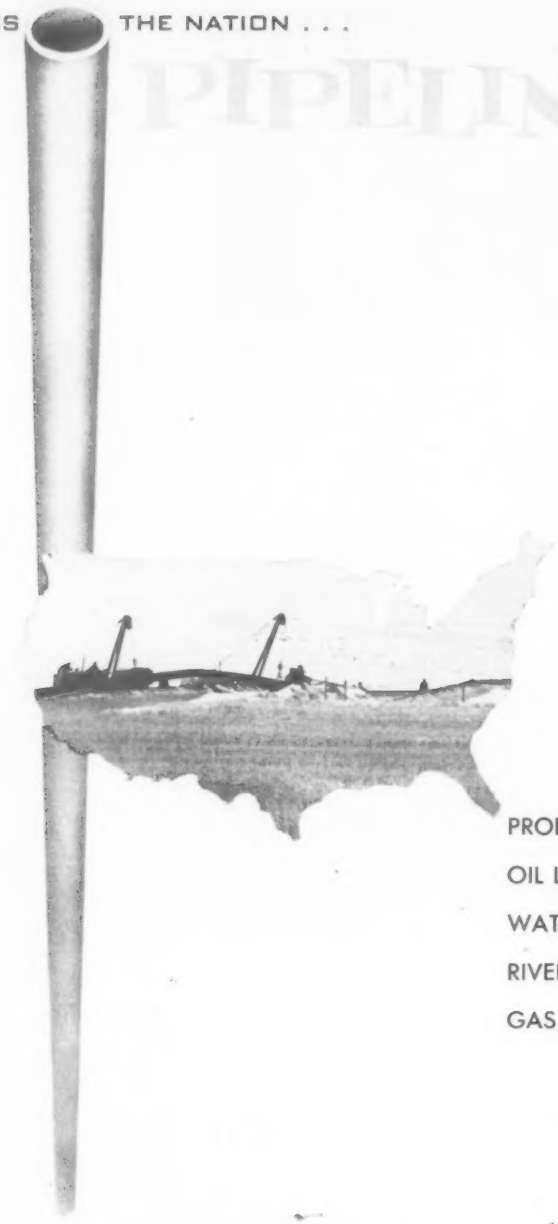
J. M. DEVINE

Development of a series of new products which will supplement the company's present line of pressure pickups later this year was revealed to the sales staff. Included in the group are a high-temperature, water-cooled pickup and a differential-pressure indicator.

Chairman of this sales conference was Joseph M. Devine, who joined Control Engineering recently as sales manager. Devine was previously sales manager, process controls division, Baird Associates, Cambridge, Mass. In addition to company executives W. A. Jones, George S. Cherniak, and Byron White, present at the meeting were Earl Lipscomb, Dallas; E. G. Byers, Houston; Sydney S. Lee, Washington, D. C.; Edward A. Ossman, Rochester; Robert G. Siff, Dayton; Sy Sterling, Detroit; Robert A. Waters, Walthem; James Everett, Chicago; Frank Gates, Salt Lake City; C. E. Ault, Los Angeles; J. T. Hill, Los Angeles; Warren Huth and H. E. Ransford, Pittsburgh, and Robert C. Iseman, Binghampton, N. Y.

ACROSS THE NATION . . .

PIPELINES



PRODUCTS PIPELINES

OIL LINES

WATER PIPELINES

RIVER CROSSINGS

GAS PIPELINE CONSTRUCTION

R. H. FULTON & COMPANY

CONTRACTORS

PHONE 5-5231 LUBBOCK, TEXAS P. O. BOX 1526

Pipe-Line Construction

PIPE-LINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipe-line companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the company name.

Crude-Oil Pipe Lines

• **California-Oregon Pipe Line System**—103 miles, 6-in., proposed, Crescent City, Calif., to Medford, Oregon.

Cities Service Pipe Line Co.—64 miles, 18-in., under way, Sour Lake, Tex., to Lake Charles, La. Associated Pipe Line, contractors. Completion date April 1953.

Cooperative Refinery Association.—48 miles 6-in., under way, Phillipsburg, Kans., to Holdredge, Neb.

• **R. A. Goodall.**—45 miles, 6-in., planned, Little Beaver to Merino, Colo. (To connect with Sterling system).

• **Gulf Oil Co.**—22 miles, 8-in., planned, Portilla field, Texas, to Corpus Christi.

• **Gulf Refining Co.**—55 miles, 10-in., planned, Bay Marchand to Plaquemines, La.

• **Humble Pipe Line Co.**—71 miles, 16-18-in., planned, East Texas to Louisiana-Texas border. (30 miles of 16-in., and 41 miles of 18-in.) Completion date 10-53.

Under way, Hawkins field, Woods County, Texas, to Longview.

Start 7-1, Longview to Louisiana border.

• **Interstate Oil Pipe Line Co.**—137.6 miles, 22-in., planned, Shreveport to Baton Rouge, La.

Interstate Oil Pipe Line Co.—68 miles, 16-in., under way, Raceland to Anchorage, La.

Under way, Raceland to Plaquemine, La.

L. E. Farley, Inc. 6-15-53.

Plaquemine to Anchorage, La.

22 miles, 18-in., contracted, Louisiana-Texas state line to near Shreveport, La. River Const. Corp. 6-53.

28 miles, 22-in., contracted, Shreveport, La., to Coushatta, La. River Const. Corp. 6-53.

Lakehead Pipe Line Co.—635 miles, 30-in., under way, Superior, Wis., to Sarnia, Ontario, Canada.

Contracted, Superior to Wisconsin-Michigan state line. Mahoney Contr.

Mackinac City along Straits of Mackinac to Red Oak, Mich. Bechtel Corp.

Red Oak via Bay City to International Boundary south of Port Huron on St. Clair River. Conyes Const.

Water crossings of Mackinac, Saginaw, and St. Clair rivers. Merritt-Chapman & Scott Corp., W. J. Meagher & Sons, Inc., and Midwestern Constructors.

Under way, Michigan-Wisconsin State line through Crystal Falls to Cooks, Mich. Anderson Bros. 10-53.

Under way, Cooks to St. Ignace, Mich., on Straits of Mackinac. Midwestern Constructors, Inc.

• **Magnolia Pipe Line Co.**—29 miles, 8-in., planned, Midland County, Texas area.

47 miles, 4-6-8-in., planned, Nolley field, Andrews County to Magutex field, West Texas.

• **Pasotex Pipe Line Co.**—146 miles, 10-in., planned, Snyder to Wink, Tex.

• **Phillips Pipe Line Co.**—45 miles, 12-in., planned, Rancho system to Sweeny, Tex. 6-53.

• **Platte Pipe Line Co.**—93 miles, 12-14-in., planned, Chatham station near Worland, Wyo., to Oregon basin, and Byron field. R. H. Fulton Co. Completion date 6-53.

Chatham, Wyo., to Oregon basin. R. H. Fulton Co.

Oregon basin to Byron-Garland field. R. H. Fulton Co.

• **Progress Pacific Pipeline Co.**—1,100 miles, 24-in., planned, Odessa, Tex., to Los Angeles Harbor, Calif.

• **Roosevelt Oil & Refining Corp.**—22 miles, 4 and 6-in., planned St. Helens to Norwich, Mich.

• **Service Pipe Line Co.**—185 miles, 16-in., planned, Bowie, Tex., to Drumright, Okla.

29 miles, 4-6-8-in., proposed, Natrona County, Wyoming.

170 miles, 12-16-in., proposed, Tioga-Beaver Lodge to Williston, N. D.

16-in., Tioga-Beaver Lodge area to Mandan, N. D.

12-in., Mandan to Williston, N. D.

41 miles, 4-6-8-in., planned, Williams and Mountrail counties, North Dakota.

• **Texas-New Mexico Pipe Line Co.**—48 miles, 8-in., planned, from Lovington, N. M.

Texas Pipe Line Co.—34 miles, 6-in., under way, Sour Lake to Port Arthur, Tex. Houston Contracting.

45 miles, 8-10-in., under way, between Erath and Bayou Sale stations. Houston Contracting Co.

• **West Coast Pipeline Co.**—960 miles, 20-22-in., planned, Wink, Tex., to Norwalk, Calif.

Products Pipe Lines

H. W. Bass & Sons., Inc.—152 miles, 4-6-in., proposed, Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

• **Bell Oil & Gas Co.**—150 miles, 6-8-in., planned, Ardmore to Drumright, Okla. Completion date 6-1-53.

Buckeye Pipe Line Co.—370 miles, 10-14-16-in., under way, Linden, N. J., via Allentown, Pa., to Auburn, Syracuse, Waterloo, and Rochester, N. Y.

Contracted, Guthsville to Dupont, Pa. Pipe Line Const. & Drilling Co.

Contracted, Dupont north to Pennsylvania-New York state line. Fulghum Contr. Corp.

Contracted, Pennsylvania-New York state line to Auburn, N. Y. Williams-Austin.

Contracted, Auburn to Syracuse, N. Y. Williams-Austin.

Contracted, Auburn to Caledonia, N. Y. Universal Map and Survey Co.

• **Coastal Products Pipe Line Co.**—260 miles, 20-in., proposed, Houston to Baton Rouge.

• **Continental Pipe Line Co.**—(Yellowstone Line)—600 miles, 8-in., planned, Billings, Mont., to Spokane, Wash.

• **Harbor Products Systems**—86 miles, 16-in., planned, Woodbury Junction, Philadelphia to Trembley Point, N. J. (Joint ownership of Sinclair Pipe Line Co., Gulf Oil Corp., and Texas Co.)

Indiana Farm Bureau Cooperative Association, Inc.—180 miles, 8-in., under way, Mt. Vernon to Indianapolis, Ind. R. B. Potashnick, contractor.

70 miles, 4-in., under way, Indianapolis to Peru, Ind. R. B. Potashnick, contractor.

Inland Empire Pipe Line Co.—504 miles, 10-in., proposed, Billings, Mont., to Spokane, Wash.

Kaneb Pipe Line Co.—236 miles, 8-in., planned, Wichita and Potwin, Kans., to Fairmont, Neb. 9-53.

• **Phillips Petroleum Co.**—54 miles, 6-in., planned, Goldsmith to Borger, Tex.

Styles illustrated
50-00 Jacket 51-00 Pants 53-00 Hat

Protective Clothing by Sawyer

- **Positively not affected by grease, oil or gasoline**
- **Highly resistant to all common chemical solutions**
- **Positively will not blister, crack or peel**
- **Tough as mulehide, wears like iron**
- **Resists scuffing, scraping, even snagging**

All Sawyer protective clothing is made with top-quality base fabric, *saturation-coated* with 6 coats of genuine DuPont Neoprene Latex*.

Also: Three-quarter and long coats, coveralls and many other styles. All clothing made in black and yellow.

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- True rotary motion — no reciprocating parts
- No metal-to-metal contact in measuring unit
- Quickly replaceable measuring element without disturbing line connections
- All welded steel housing — double case construction

Smooth continuous delivery, maintained accuracy, extreme ruggedness, and simple design assure the high dependability and low cost maintenance required to meet today's metering problems.

There's a Brodie BiRotor to handle every capacity up to 1800 Bbls. per hour, pressure ranges up to 1000 psi. Let your nearest Brodie representative show you how BiRotors can offer new efficiency and economy in handling crude and finished products. Phone, wire or write today for full details.

IT'S WHAT'S INSIDE THAT COUNTS

Double case construction with readily replaceable measuring element

Just two moving parts

BRODIE HIGH PRESSURE BiRotor HIGH CAPACITY METERS

Line Metering

CRUDE and FINISHED PRODUCTS

CAPACITIES TO 1800 Bbls. per hour
PRESSURES TO 1000 Psi.

for
- **Products or crude lines**
- **Gathering stations**
- **Tank farms**
- **Division point control**

Model B-83 Brodie BiRotor Meter with Brodimatic Counter—550 gpm, 750 Bbls./hr., 300 psi.

Model B-105 Brodie BiRotor Meter with Model T-8 Counter—1,300 gpm, 1,800 Bbls./hr., 1000 psi.

Model B-72D Brodie BiRotor Meter with Model "G" Counter —350 gpm, 500 Bbls./hr., 150 psi.

A TYPE & SIZE FOR EVERY NEED

Bbls./hr.	GPM	PRESSURE RATING — PSI			
		150	300	600	1000
170	120	B-50D	—	—	—
350	250	B-62D	B-63	B-64	B-65
500	350	B-72D	B-73	B-74	B-75
750	550	B-82D	B-83	B-84	B-85
1,100	800	B-92	B-93	B-94	B-95
1,800	1,300	B-102	B-103	B-104	B-105

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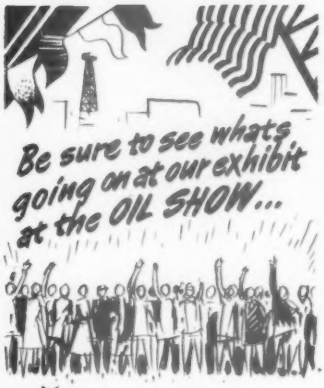

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INTERNATIONAL PETROLEUM EXPOSITION

52 miles, 10-in., planned, Shell's Brookshire system to Sweeny, Tex. 5-53.

• **Plantation Pipe Line Co.**—82 miles, 14-in., planned, Charlotte to Greensboro, N. C.

Salt Lake Pipe Line Co.—140 miles, 8-in., Pasco to Spokane, Wash. Completion date 6-53.

Standard Oil Co. (Ind.).—316 miles, 12-in., under way, Sugar Creek refinery to Dubuque, Iowa.

Under way, Polo, Mo., to Unionville, Mo. Sheehan Construction Co.

Planned, Mandan, N. D., to Moorhead, Minn.

• **Standard Oil Co. (Ind.).**—243 miles, 10-12-in., proposed, Whiting, Ind., to River Rouge, Mich.

Sun Pipe Line Co.—45 miles, 8-in., start 5-53, Toledo, Ohio to Inkster Junction west of Detroit. 10-53.

Texas Pipe Line Co. (Evangeline Products Systems)—196 miles, 16-in., under way, Port Arthur, Tex., to Baton Rouge, La. Panama-Williams Co. Completion date 7-53.

Texas Pipe Line Co.—29 miles, under way, Fuller Ranch gasoline plant to Basin Pipe Line System, West Texas. Holder Const. Co.

• **United States Pipe Line Co.**—1,799 miles, 22-26-in., proposed, Beaumont, Tex., to Newark, N. J.

Beaumont, Tex., to Memphis, Tenn.

Memphis, Tenn., to Louisville, Ky.

Louisville, Ky., to Newark, N. J.

Laterals to Paducah and Lexington, Ky.

• **Williston Basin Pipe Line Co.**—244 miles, 8-in., proposed, Laurel-Billings, Mont., refineries to Glendive, Mont.

• **Wolverine Pipe Line System**—200 miles, 14-in., planned, Chicago to Toledo and Detroit. (Joint ownership of Shell, Texas, and Cities Service). Completion date 1-54.

Natural-Gas Pipe Lines

• **Allied Gas Co.**—24 miles, 6⅝-in., proposed, McLean to Champaign County, Illinois.

• **Arkansas - Missouri Power Co.**—140 miles, 2 to 10-in., planned, St. Francis River, Clay County, Arkansas, to near Campbell, Mo.

• **Associated Natural Gas Co.**—88 miles, Missouri.

• **Atlantic Seaboard Corp.**—29 miles, 26-in., proposed, looping along Cobb-Rockville line.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

• **Chattahoochee Natural Gas Co.**—70 miles, proposed, Floyd County, Georgia, to Dalton, Ga.

• **Chicago District Pipe Line Co.**—35 miles, 24-30-in., proposed, Chicago area.

• **Cities Service Gas Co.**—21 miles, 26-in., planned, Franklin and Anderson counties, Kansas.

15 miles, 20-in., Craig County, Oklahoma, to Lawrence County, Missouri.

69 miles, 20-16-in., proposed, Cleveland, McClain, and Garvin counties, Oklahoma.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

Colorado Interstate Gas Co.—250 miles, 20-in., under way, Kit Carson, Colo., to Amarillo, Tex. R. H. Fulton & Co., contractor. Pueblo County to Fowler, Colo.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., proposed, Green River, Wyo., to Denver, Colo.

116 miles, proposed, Colorado, Oklahoma, Texas, and Kansas.

• **Cumberland and Allegheny Gas Co.**—31 miles, 12-in., proposed, Garrett County, Md., to Keyser, W. Va.

• **East Tennessee Natural Gas Co.**—158 miles, 16-in., planned, Knoxville to Kingsport, Tenn. (58 miles of laterals.) 11-53.

• **El Paso Natural Gas Co.**—1,778 miles, proposed, Permian basin, New Mexico, Texas, and Colorado.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

• **Gulf Interstate Gas Co.**—860 miles, 30-in., proposed, Acadia Parish, La., to Boyd County, Ky.

329 miles, 12 to 24-in., proposed. Laterals off Acadia Parish, Louisiana, to Boyd County, Kentucky, line.

• **Home Gas Co.**—32 miles, 12-in., planned. Breesport to Union Center, N. Y.

17 miles, 12-in., proposed, loops from Hansock to Sanford, N. M.

46 miles, 12-in., under way, Tioga and Broome counties, New York. H. L. Gentry Const.

22 miles, 12-16-in., under way, Binghampton, N. Y.

• **Hope Natural Gas Co.**—33 miles, 8-10-12-in., planned, Wyoming County, West Virginia, south to Buchanan County, Virginia.

Houston Pipe Line Co.—40 miles, 16-in., under way, Edna to Tom O'Connor gas field. Houston Contracting Co. 4-53.

• **Interstate Power Co.**—26 miles, 8-in., proposed, from Nat. Gas P. L. Co. America line near Hooppole, Ill., to Clinton, Ia.

Iowa-Illinois Gas & Electric Co.—41 miles, 10-in., planned, Washington County to Cedar Rapids, Iowa.

• **Kansas-Nebraska Natural Gas Co., Inc.**—179 miles, planned, Kansas and Nebraska.

54 miles, 4-6-in., planned, Neligh to Hartington, Neb. Completion date 1953.

42 miles, 4-6-in., planned, Neligh to O'Neil, Neb. 9-53.

196 miles, planned, to serve Wisner, Pilger, and Stanton, Neb.

Kansas Nebraska Natural Gas Co.—70 miles, 6-8-in., under way, Nebraska City to Denver-Julesburg basin, Colo.

• **Lone Star Gas Co.**—100 miles, proposed, storage fields to the Dallas-Fort Worth area.

35 miles, 12-in., proposed, southeastern Schleicher County.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

• **Michigan Gas Storage Co.**—30 miles, 26-in., planned, Lainsburg Junction north. 7-53.

• **Mid-Continent Pipelines, Ltd.**—1,860 miles, 30-in., proposed, Alberta to Montreal, Canada. Fish Engineering Co.

• **Midsouth Gas Co.**—191 miles, planned, Helena to Palestine, Ark.

• **Mississippi River Fuel Corp.**—109 miles, 10-18-in., planned, laterals in Woodlawn and Waskom gas fields, Texas.

Missouri Central Gas Co.—25 miles, 6-in., contracted, Moberly to Macon, Mo. L. R. Young Const. Co.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

• **Montana Power Co.**—52 miles, 16-in., planned, Canada - Montana border to Cut Bank, Mont.

• **Morganfield Natural Gas Co.**—31 miles, 4-6-in., planned, through Sturgis, Providence,

Clay, Diamond, Wheatcroft, and Sullivan, Ky.

• **Natural Gas Producers Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **Nevada Natural Gas Pipe Line Co.**—114 miles, 12¾-in., proposed, Topock, Ariz., to Las Vegas, Nev.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

• **New York State Electric and Gas Co.**—59 miles, 8-10-24-in., proposed, Oneonta and Norwich to DeRuyter, N. Y.

New York State Natural Gas Corp.—104 miles, 14, 16, 20-in., under way, looping on Westmoreland, Armstrong, and Tioga counties, Pennsylvania. (Includes 17 miles, 16-in., in Potter County, Pennsylvania, and 21 miles 14-in., replacement in Line No. 507, New York.)

Colesburg Junction to Sabinsville, Pa. (begin at completion of Angelica job), Williams-Austin. Howard Bauer, superintendent.

21 miles, Columbiana and Stark counties, Ohio.

• **New York State Natural Gas Co.**—75 miles, 20-in., proposed, Cameron County to Armstrong County, Pennsylvania.

58 miles, 14 and 20-in., planned, New York State line.

Sabinsville to Boom station.

Skaneateles to Onondaga, N. Y.

Ithaca to Dryden, N. Y.

Niagara Mohawk Power Corp.—55 miles, 10-in., begin 4-1-53, Watertown to Syracuse, New York. Williams-Austin Co.

• **Northern Indiana Fuel & Light Co.**—33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

• **Northern Natural Gas Co.**—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

210 miles, 26-in., planned, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

400 miles, 24-in., proposed, Emerson, Manitoba south to Red River Valley through Fergus Falls on to St. Paul, Minn.

102 miles, planned, extension.

Northern Natural Gas Co.—140 miles, 4-6-8-in., under way, south of Rolla, Kans., to Guymon, Okla. Reese Bros. Const. Co. E. H. Reese, spreadman at Hugoton, Kans.

• **Northwest Natural Gas Co.**—750 miles, planned, Washington, Oregon, and Idaho.

24-in., Eastport, Idaho, to Monroe, Wash.

18-in., Monroe to International boundary near Lynden, Wash.

22-in., Monroe to near Seattle, Wash.

20-in., Seattle to Portland, Ore.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

Oklahoma Natural Gas Co.—50 miles, 18-in., under way, Sapulpa to Chouteau, Okla. Engineering Const. Co. 6-53.

• **Pacific Gas & Electric Co.**—50 miles, 12-16-20-in., planned, Fresno to Merced, Calif.

(Section 1) 16-in., Burrel to near Easton, Calif.

(Section 2) 20-in., Holm to Topock-Milpitas line.

(Section 3) 12-in., parallel existing Madera-Livingston line, planned, Monterey to Fort Ord to Castroville; Napa Wye to Shellville; Cotati to Santa Rosa, Calif.

170 miles, 34-in., proposed, main-line loops along Topock, Ariz., to Milpitas, Calif.

Pacific Gas & Electric Co.—141 miles, 34-in., under way, parallel sections along Topock-Milpitas line. Engineers Pipe Line, Ltd. Summer 1953.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

Panhandle Eastern Pipe Line Co.—70 miles, 24-26-in., under way, looping from Sneed, Tex., to Emporia, Kans.

174 miles, 30 and 26-in., contracted. Tuscola, Ill., eastward—looping present system; R. A. Conyes, contractor.

26-in., Edgerton, Mich., Anderson Brothers.

30-in., looping in Tuscola, Ill.

30-in., looping in Montezuma, Ind.

30-in., looping in Zionsville, Ind.

• **Panhandle Eastern Pipe Line Co.**—23 miles, planned, Peoria County, Illinois.

• **Peoples Natural Gas Co.**—25 miles 6 to 24-in., planned, Cambria and Blair counties, Pennsylvania.

• **Permian Basin Pipeline Co. (Northern Natural)**—163 miles, 16-30-in., proposed, Permian basin and eastern New Mexico.

• **Phillips Petroleum Co.**—125 miles, 2 to 24-in., planned, Midland, Upton, Glasscock, and Reagan counties, Texas. Completion date 6-53.

28 miles, 10-in., planned, Bayou Plant to Adams Terminal. Completion date 7-53.

• **Public Service Co. of Colorado**—95 miles, proposed, Douglas Creek and other gas fields to Grand Junction, Colo., area.

• **Rockland Light & Power Co.**—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

• **Shenandoah Gas Co.**—39 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va.

• **South Carolina Natural Gas Co.**—160 miles, 16-12-10-in., proposed, Aiken, S. C., to cities of Columbia, Summerville, and Charleston, S. C.

• **South Georgia Natural Gas Co.**—339 miles, 2-12-in., planned, Phoenix, Ala., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee.

• **Southern California Gas Co.**—35 miles, planned, Antelope Valley, California.

Southern California Gas Co. and Southern Counties Gas Co. of California—45 miles, 30-in., contracted, looping on line from Arizona border to Los Angeles. J. B. Gill.

81 miles, 30-in., contracted, Whitewater to Desert Center, Calif. J. B. Gill.

Contracted, looping between Blythe and Colorado River and on westward of Indio. J. B. Gill.

• **Southern California Gas Co., and Southern Counties Gas Co.**—73 miles, 30-in., planned, loops on main line from Blythe to Los Angeles.

Southern Natural Gas Co.—1,235 miles, 24 to 4½-in., contracted, Louisiana, Mississippi, Alabama, and Georgia, and South Carolina. Houston Contracting and H. C. Price. Fall 1953.

Gwinville, Miss., to Franklinton Junction, La.

Lateral from Franklinton Junction, La., to Sand Hook field, Mississippi.

Franklinton Junction, La., to Duck Lake gas field, Louisiana.

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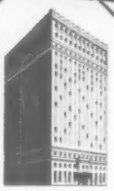

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Duck Lake gas field, Louisiana, to Lake Sand field, Louisiana.

• **Southern Union Gas Co.**—21 miles, 20-in., planned, Albuquerque, N. M.

30 miles, 12-20-in., contracted, San Juan County, New Mexico. R. H. Fulton & Co.

• **Southwest Gas Corp., Ltd.**—26 miles, proposed, from P.G.& E. line to Victorville, Calif.

• **Tennessee Gas Transmission Co.**—574 miles, 30-in., proposed, Kinder, La., northeast through Louisiana, Mississippi, to Portland, Tenn.

130 miles, proposed, looping in Texas and Louisiana. Including 67 miles of 30-in. line.

63 miles, 26-in., proposed, Ohio and Pennsylvania.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U. S.-Canadian border near St. Catherines.

Tennessee Gas Transmission Co.—Start June 1, 22 miles, Natchitoches, La., to Goldonna, La. Oklahoma Contracting Co.

18 miles, under way, Bolivar, Tenn., to Selmer, Tenn. Oklahoma Contracting Co.

47 miles, under way, Springfield, Tenn., to near Bowling Green, Ky. Anderson Bros.

35 miles, under way, Campbellsville, Ky., to Danville, Ky. Western Pipe Line Constructors.

21 miles, under way, Carter, Ky., to Ohio River. Western Pipe Line Constructors.

70 miles, 24-in., under way, Mercer, Pa., to Pigeon, Pa. H. C. Price Co.

60 miles, under way, Pigeon, Pa., to Hebron field, Potter County, Pennsylvania. Bechtel Corp.

Texas Eastern Transmission Corp.—315 miles, 24-in., under way, Provident City, Tex., to Castor, La. Brown & Root, Inc.

Constructed, Lavaca County to Waller County, Texas. Associated Pipe Line Contractors, Inc.

Contracted, Polk County to Shelby County, Texas. Williams Brothers Co.

Contracted, River crossings of Trinity, Brazos, Colorado, and Saline rivers. Pentzien, Inc.

80 miles, under way, Warren to Livingston, Tex. Anderson Bros. 5-20-53.

• **Texas-Ohio Gas Co.**—1,435 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va. Completion date 6-30-53.

• **Trans-Northwest Gas, Inc.**—246 miles, proposed, International Boundary near Osoyoos, B. C., to Washington and Idaho.

275 miles, branch lines.

• **Union Oil Co. of California**—40 miles, 8-10-in., planned, San Joaquin Valley and Los Angeles Basin.

• **United Fuel Gas Co.**—50 miles, 20-24-in., proposed, Wood County to Lanham, W. Va.

32 miles, 24-in., proposed, near Ripley, W. Va., to Lanham station, Putnam County, W. Va.

• **United Gas Pipe Line Co.**—44 miles, 20-in., planned, Lirette field to Harvey, La.

31 miles, proposed, offshore Gulf of Mexico to Terrebonne Parish, Louisiana.

• **United Natural Gas Co.**—50 miles, 12-in., planned, Elk County to Jefferson County, Pennsylvania.

• **Utah Natural Gas Co.**—103 miles, 16-18-in., proposed, Clear Creek field near Price to Salt Lake City, Utah.

18-in., Clear Creek to Provo, Utah.

16-in., Provo to Salt Lake City, Utah.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Warren Petroleum Corp.—78 miles, 2-24-in., proposed, Lovington, N. M. Completion date 9-53.

Westcoast Transmission Co., Ltd.—(See foreign natural gas pipe lines).

• **Western Slope Gas Co.**—39 miles, 8-in., planned, Garmesa to West Douglas Creek, Colo. Foutz & Bursum Const. Co. 10-53.

Wilcox Trend Pipe Line Co. (Harry Bass Drlg. Co.)—157 miles, 14-16-20-in., under way, gathering system for delivery to proposed Texas Eastern terminal at Provident City, Tex. H. B. Zachry. Completion date 5-53.

Under way, Lavaca County to DeWitt County, Texas, and Duval County to DeWitt County, Texas. H. B. Zachry. 5-53.

Under way, laterals and gathering lines. Altgelt Const. Co.

Foreign Crude-Oil Pipe Lines

Arabian American Oil Co.—16 miles, 12-in., under way, loops on Al Kobar, Saudi Arabia to Bahrein Island, submarine lines.

Basrah Petroleum Co.—72 miles, 24-in., under way, Zubair to Fao. Completion date May 1953.

• **Cia. de Petroleo Ganso Azul, Ltd.**—48 miles, 4-in., planned, Ganzo Azul field to Pucalpa on upper Ucayali River, Peru.

• **Creole Petroleum Corp.**—25 miles, 34-in., planned, Lagunillas to La Salina (State of Zulia). Completion date April 1953.

Direccion General de Yacimientos Petroliferos Fiscales—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Interprovincial Pipe Line Co.—135 miles, 24-in., looping from Regina to U. S. border, Canada.

• **National Iranian Oil Co.**—38 miles, 12-in., planned, Lali to Masjid-i-Sulaiman, Iran.

27 miles, 12-in., planned, Kut-Abdullah to Zergan, Iran.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

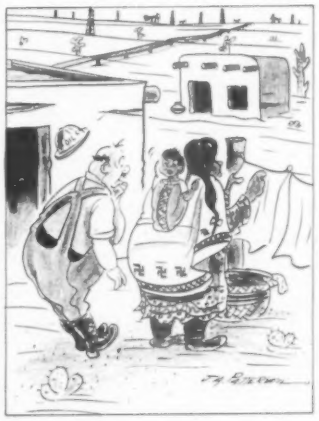
Petroleos Mexicanos.—125 miles, 10-in., under way, Jose Colomo to El Plan, Mexico.

• **Saskatoon Pipe Line, Ltd.**—56 miles, 6-in., planned, Milden to Saskatoon, Sask.

Texas Petroleum Co.—60 miles, 4-6-in., under way, Pta. Nino to La Dorada.

• **Trans Mountain Oil Pipe Line Co.**—30 miles, planned, Vancouver, B. C., terminal to Ferndale, Wash.

Trans Mountain Oil Pipeline Co.—711 miles, 24-in., under way, Edmonton, Alta., to



"You'll have to go around in front and talk to my mother."

Vancouver, B. C. Canadian Bechtel, Ltd., engineers. Completion date 8-53.

Edmonton to Acheson, Canadian Pipe Line Const. 8-53.

Acheson to Blue River, B. C., Comstock Midwestern. 8-53.

Blue River, B. C., to Coquehalla, B. C., Mannix, Ltd. 8-53.

Coquehalla to Vancouver, B. C., Comstock Midwestern. 8-53.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Foreign Products Pipe Lines

Colombian Ministry of Petroleum. — 115 miles, 4-in., begin 1953, La Dorada to Cartago, Colombia, Williams Bros. Engineers.

93 miles, 8-in., begin 1953, Cantimplora to Dorada, Colombia, William Bros. Constructors.

• **Empresa Nacional del Petroleo** — 80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 6-in., contracted, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor; C.R.C. Engineering Co., engineers.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **Shell Co. of Australia.**—58 miles, 8-in., planned, Geelong, Melbourne to Newport, Australia.

• **Sun Pipe Line Co. of Canada.**—200 miles, 8-in., planned, Sarnia, Hamilton, Toronto, Ont.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

Foreign Natural-Gas Pipe Lines

• **Azienda Generale Italiana Petroli.**—110 miles, 12-14-16-in., Start 11-52. Cortemaggiore to Genoa. Completion date 11-53.

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

Direccion General del Gas del Estado—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

• **Empresa Nacional del Petroleo**—80 miles, 10¾-in., planned, Concon to Santiago, Chile.

• **Northwest Natural Gas Co.**—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos.—205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

• **Trans-Canada Pipe Lines, Ltd. (Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

747 miles, 8 to 24-in., gathering system in Alberta.

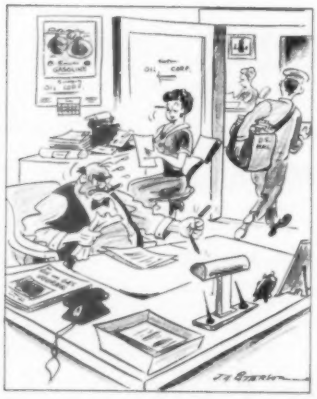
• **Westcoast Transmission Co., Ltd.**—1,110 miles, 24-in., planned, Dawson Creek, B. C., through Pine Pass and Fraser River Valley to Kamloops, Princeton, and Vancouver to Portland. Ford, Bacon & Davis, engineers.

280 miles, 20-in., planned, Pincher Creek to Montana on to Spokane, Wash. Ford, Bacon & Davis, engineers.

138 miles, 20-in., planned, Sumas to Tacoma, Wash.

139 miles, 18-in., planned, Tacoma, Wash., to Portland, Ore.

• **Western Pipe Lines.**—833 miles, 24-in., proposed, from southern Alberta, eastward across the Canadian prairies, serving principal towns and cities along the route to a point near the International boundary.



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DIGEST OF NEW EQUIPMENT

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TRADE LITERATURE

1 NICOLET QUALITY ASBESTOS PIPE-LINE FELT. The second edition of this multicolored booklet includes samples of 8 and 15 lb. and 15-lb. perforated pipe-line felt. It describes its background use, application, availability, and method of manufacture. *Middle West Coating & Supply.*

2 TOMORROW'S TOOLS TODAY! Catalog No. 52 describes the technical oil-field services offered by Lane-Wells, including perforating, well logging, and packers and packer servicing. Addresses of all service branches are tabulated on the inside front cover. Extensive data tables are used in describing each service, and all equipment is illustrated. *Lane-Wells Co.*

3 TATE PROCESS LINING SERVICE is offered for pipe 4 to 16 in. and "in place" Centriline Process lining service for pipe 16 to 144 in., with expert, trained crews and complete mobile equipment and facilities. Complete information is available on how to obtain new pipe-line performance from old pipe. *Pipe Linings, Inc.*

4 HIGH SPEED GEAR UNITS, Bulletin 5204, is an aid to engineers, designers, and users of power transmission equipment. Bulletin contains horsepower ratings, specifications, outline dimensions, parts designations, engineering information, and assembly diagrams. *Western Gear Works.*

5 NEW 15X BULLDOZER is fully described in a four-page folder, which illustrates operational and portability advantages of "no pushbeam" design, and explains its treater versatility and maneuverability. The 15X is equipped with "roll action" blade, and features a 96-in. over-all width, and a big-capacity 51-in. high moldboard, which raises a full 30½ in. above ground and bites deep to 15½ in. below ground. *The Baker Manufacturing Co.*

6 MACK H-SERIES CAB-OVER-ENGINE MODELS. This multicolored brochure describes and illustrates four and six-wheeled, gasoline or diesel-powered tractors with full-tilt cab, giving quick access to engine. Bulletin also gives graphic description of many other outstanding H-Series features, including its short wheelbase and over-all length, visibility, and built-in sleeper berth. *Mack Motor Truck Corp.*

7 BULLETIN 546 gives descriptions and illustrations covering air compressors, Oilfreair and Oilfregas compressors, Airchek valves, and Thrustfre centrifugal pumps found in a wide range of service. A list of customer users is included. *Pennsylvania Pump & Compressor Co.*

8 EXCEL-SO METER CALIBRATING TANKS, a four-page, two-color brochure, perforated for loose-leaf binding, describes both mobile and stationary calibrators in capacities from 25 to 2,000 gal. Units are mounted on rubber tires. *Warner Lewis Co.*

9 MILE AFTER MILE OF DEPENDABILITY. This attractive multicolored catalog covers a complete range of motor scrapers, motor graders, and tractor sizes to meet pipe-line requirements. Catalog specifically features A-C HD-20 boom-tractor with hydraulic torque-converter drive with complete specifications. Photographs of A-C equipment are included on numerous phases of pipe-line work. *Allis-Chalmers Manufacturing Co.*

10 SELF-CLEANING STRAINERS, a new 12-page booklet,

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, May 4, 1953

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11 INDUSTRIAL POWER DISTRIBUTION IDEA BOOK, 28-page, illustrated, two-color bulletin, is a guide for plant engineers on electric-power-distribution practices in large and small plants. Bulletin covers utility-distribution practices; methods of buying electric power; what to do when a choice of primary voltages is available; application of primary switches and circuit breakers; and types and arrangements of primary cables. *General Electric.*

12 SUPERIOR INSULATION is a new graphically illustrated 28-page brochure on industrial insulation with comprehensive description of superior products, engineering data on installations, and recommendations for adaptability and economy in application. Time and motion studies, specification engineering as well as plant maintenance information are shown. *The Aber Co.*

13 BLAW-KNOX AUTOCLAVES FOR PRESSURE-TEMPERATURE REACTIONS. Catalog No. 2413 explains safety measures taken to insure safe operation of autoclaves by purchasers. Various possible heating systems and advantages are discussed. Systems include: hot water, steam, direct and indirect firing, hot oil, dowtherm vapor and liquid, electric, induction, and high-temperature units using mercury vapor or molten salts as heat-transfer medium. Materials of construction, types of agitation, stuffing boxes, and instrumentation are also covered. *Blaw-Knox Co.*

14 TYPE LS GAS, DIESEL, AND GAS-DIESEL ENGINES. This new general bulletin provides complete data and specifications of four-cycle Type LS engines of 15½-in. bore and 22-in. stroke. Engines are operated by gas, gas-diesel, and diesel, atmospheric or supercharged, and are rated from 690 to 2,500 hp. *The Cooper-Bessemer Corp.*

15 THE TRUE MASS RATE FLOWMETER, a four-page data sheet, describes an industrial control instrument capable of measuring true mass flow of any gas, liquid, solid, or mixture which can be made to flow through pipe. Measurements can be made completely independent of temperature or pressure. *Control Engineering Corp.*

16 MICROMATIC DRILLING CONTROL. This four-color, eight-page bulletin presents features of this control, its principle of operation, operating details illustrated by a two-page color picture diagram, and advantages of a safe, automatic, precision feedoff for drilling rigs. *The National Supply Co.*

17 STEAM AND LIQUID CONTROL EQUIPMENT, a 60-page catalog, describes complete line of steam, gas, air, oil, and water-regulating equipment. Catalog includes complete specifications, operational data, and prices on line of pressure, temperature, combination pressure and temperature regulators, diaphragm valves, motor-operated valves, strainers, and water gages. Useful charts are also included, as well as capacity tables and flange charts. *O. C. Keckley Co.*

18 DISPENSERS. Bulletin 82-11 describes new air-pressure-operated dispenser to feed oil and other fluids by air pressure to elevated, distant, and inaccessible points for use on applications where gravity feeding is not suitable. Dispensers can be used on a variety of applications, including spray oiling. *Oil-Rite Corp.*

19 ELECTRONIK CONTROLLERS, Catalog 1530, comprises 56 fact-filled pages describing all types of ElectroniK control instruments which are used to measure and control a multiplicity of process variables. Included are detailed specification and control action descriptions and ratings for both electric and pneumatic-type controllers. *Minneapolis-Honeywell Regulator Co.*

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by Dan B. Miller

20 G-B ULTRAFINE PIPE INSULATION is one-piece, molded, fine glass-fiber pipe insulation. It is flexible, lightweight, nonbreakable, and is easy to apply and to handle. It is composed of extremely fine, blown-glass fibers bonded with a phenolic resin and molded into

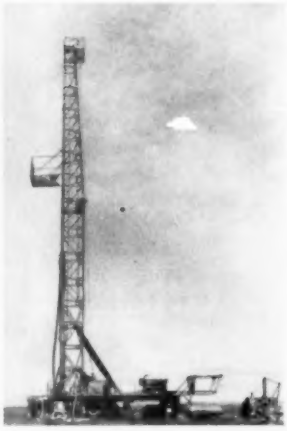
one-piece sections. It is available in 3 or 6-ft. lengths, in a wide variety of sizes and thicknesses, for use as pipe insulation where temperatures do not exceed 350° F. or as an outside layer over a high-temperature insulation. This new glass-fiber pipe covering will not rot, mold, decay, or absorb moisture. It resists the attack of most acids and alkalies and is not corrosive to metals. It can be easily cut with a knife, easily tailored to fit valves and fittings. There is virtually no breakage or waste because it does not splinter, chip, crumble, or otherwise disintegrate in normal handling. It is self-nesting and is designed to nest with other pipe insulations. Only one longitudinal seam gives less possibility of heat leakage. *Gustin-Bacon Manufacturing Co.*

IT'S NEW ✓ CHECK IT

21 A NEW HIGH-SPEED JOINT CLEANER automatically cleans inside or outside pipe ends or threaded joints in 6 to 8 seconds. The new joint cleaner is designed to speed reconditioning of old or reclaimed well pipe and pipe lines. It requires no changeover of equipment to clean inside or outside. It will clean pipe ends 2 to 10 in. The joint cleaner has a wire-brush head that revolves around the pipe ends to remove all deposits. It also has a provision for shooting a solvent or cleaning fluid onto the pipe end to dissolve the caked material. It consists of an air-driven motor and a processing head containing a spring-loaded brush guide and wire brush. The motor is a single-stage, air-driven type, slip-fit constructed. It is muffled and provision is made for proper lubrication. The brush head consists of a 2-in. replaceable wire brush. The cleaner processing head revolves around the pipe end at 40 r.p.m. The entire unit weighs 16 lb. and is extremely portable. *Airetool Manufacturing Co.*

IT'S NEW ✓ CHECK IT

22 MODEL 3,000 PORTABLE DRILLING RIG. This new rotary rig is designed to drill to 4,000 ft. with 3½-in. drill pipe, 3,000 with 4½-in. drill pipe, and up to 7,000 ft. in workover. The mast, 87 ft. in height, is constructed of seamless steel tubing and is raised and lowered by means of two triple telescoping hydraulic cylinders. Mounted on a tandum-axle, dual-wheel trailer the unit is completely portable. Three trucks can easily transport the rig and all necessary equipment. Under actual operational conditions this rig has been set up and drilling in less than 60 minutes. Oil bath rotary table with a 12-in. opening, 3-in. water course, oil-bath water swivel, and a combination hook block are standard. A wide range of power units is available driving through either a power takeoff or a torque converter. *Mayhew Supply Co., Inc.*



IT'S NEW ✓ CHECK IT

23 NEW MULTISEAL SELF-CLEANING GATE VALVE. As a full-opening conduit-type valve, the Seal-O-Ring provides an impassable seal that shuts off bub-

KEEP INFORMED ✓SAVE TIME ✓TEAR OUT CARD ✓CHECK IT ✓MAIL IT

This Digest of New Equipment offers you a quick resume of important features of new or improved products and trade literature and the opportunity to obtain complete information on each subject by use of the convenient "CHECK IT - MAIL IT" service card.

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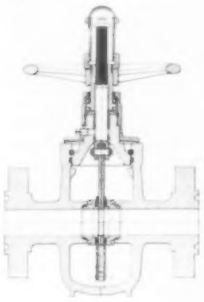
ble-tight without resorting to wedges, plugs, lubricants, or other packing devices. A precision-finish port plate freely slides open and closed between floating self-aligning dual sealing rings. Each time the port plate is moved, the loosely mounted barrier seals are free to move, with no freezing or sticking. Thus, the operating force required to move the valve is phenomenally small. It is never necessary to hammer or crowbar the wheel. The polished surfaces of the port plate and seals are so accurate and precise as to prevent entrance of foreign substances. Pressure in either direction of flow multiplies sealing efficiency. The more line pressure the greater the seal. Positive dead-tight sealing action of metal-to-metal contact is augmented by flexibly resilient O-rings retained within the piston sealing-ring assemblies. The sealing ring and O-rings are constantly imposed against the sliding port plate by the thrust action of the piston sleeve. These components also affect self-cleaning and squeegee wiping of the port-plate seating surfaces. Thus the smooth seat finish is constantly preserved with no scoring, abrasion, galling, or corrosion. *Grove Regulator Co.*

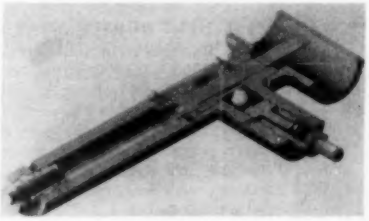


IT'S NEW CHECK IT

24 WIRE ROPE WITH PLASTIC CORE. The plastic core in this rope is unaffected by the acids, caustics, and other subsurface substances which destroy fiber cores. Neither lack of moisture during storage nor excessive amounts of moisture during use has any effect on the plastic core. The plastic core maintains its resilience under adverse conditions. The joints in plastic core are homogeneous, with strength in the splice identical with that throughout the rest of the length. Plastic core absorbs no water, so the steel of the rope is not subjected to rusting from that source. Strength and toughness are uniform throughout the length of a plastic core. Plastic Core wire rope is available in diameters ranging from $\frac{3}{8}$-in. to several inches. The cores may be surrounded by as few as three and as many as eight steel strands. These strands, in turn, may be made up of 7, 19, 25, or 41 steel wires. *Jones & Laughlin Steel Corp.*

IT'S NEW CHECK IT

25 WILLIS HIGH-PRESSURE CORROSION DETECTOR is a tool designed for the injection and withdrawal of metal samples in high-pressure pipe lines and closed vessels. It is a simple, compact device for subjecting the component metals of the system to the fluid for scientific study of corrosion rates, without shutting down the system or installing expensive bypass piping. A removable piston carries the sample in or out of the high-pressure line or vessel. Hydraulic fittings in the cylinder are used to drive or release the piston assembly, which is removed or replaced through the quick opening end of the cylinder. Two models are available—the swing check valve and the



ball check valve (illustrated), both constructed to hold the high pressures found in gas plants, refineries, pipe lines, or well heads. By substituting the sample carrying piston with a shutoff piston, locked in place by a quarter turn, the cylinder and check-valve assembly may be removed. The base of the Corrosion Detector is screwed into a standard, welded and drilled, half coupling or tee. *Willis Oil Tool Co.*

IT'S NEW CHECK IT

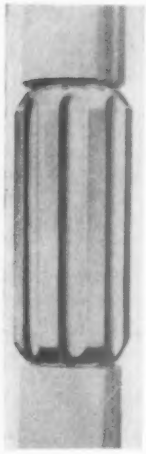
26 PIPE-ROLLING TOOL speeds up the loading, unloading, and racking of pipe. It consists of two solid steel wheels or rollers in a cage mounted on a 5-ft. handle. The rollers, when applied to the pipe by manual pressure cause the pipe to roll and the rollers turn freely with the pipe. Pipe can be rolled up a steep ramp without stopping. Eliminates cut and bruised hands and feet as no personal contact with the pipe is necessary. No heavy lifting or stooping. Cuts handling time in half. Used in pairs, the tool is sturdily built to make it practically indestructible yet light in weight. *Pipe Rolling Tool Co., Inc.*

IT'S NEW CHECK IT

27 THE MS-1 MULTISCOPE is trouble shooter for locating leaks and knocks in the piping system and foreign noises in the circulating pump. The Multipscope traces the trouble sound to its source by locating the point of greatest intensity. Once knowing the source and type of sound, an accurate diagnosis can often be made, even though the cause of trouble is hidden from view. This eliminates time-consuming searches and needless dismantling. The Multiscope is easy to use and has a simple, trouble-free con-

struction. There are no electrical connections, no radio tubes, nothing to go wrong. *Armstrong Machine Works.*

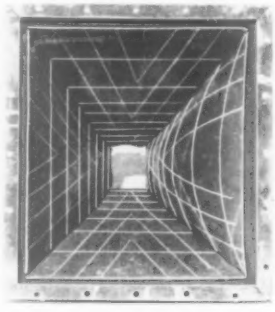
IT'S NEW — CHECK IT



28 NEW RUBBER STABILIZER that insures maximum drill-string stabilization, operates in the open hole with remarkable efficiency, and provides the driller with an improved safety margin. It keeps drill pipe in more perfect alignment with drill bit, reduces drill-collar buckling, and increases rock-bit efficiency. This stabilizer is constructed of an 18-in. rubber sleeve made of an oil and temperature-resistant rubber, and mounted on a one-piece 6-ft. forged-steel mandrel, heat-treated for maximum strength and toughness. The sleeve is constructed in half sections joined together with a metal tongue and groove which are securely fastened by latching studs on each side. A distinctive feature of the new Stabilizer is the deep fluted channels both inside and out on the rubber sleeve, which permit full circulation of cuttings and mud. The Stabilizer floats on the mandrel and contacts the wall of the hole but cannot cut into the wall of the hole. The wide 18-in. surface of the rubber sleeve acts as a large roller bearing. It absorbs and transmits all forces tending to start drill-stem whip and rock-bit gyrations or walking, to the formation. *Security Engineering Division, Dresser Operations, Inc.*

IT'S NEW — CHECK IT

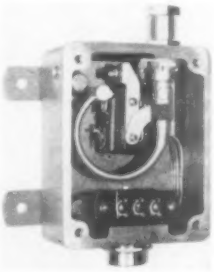
29 PULSATING RUBBER is an entirely new process for handling dry bulk material. On the slope sheets of hopper cars and on the turning wall of conveyor elbows and U-joints, a sheet of tough, abrasion-resisting rubber is attached, bonded around the edges only, leaving the center area free. Air is then injected behind the rubber causing it to expand and break the congestion. The pulsating action can be automatically controlled and easily set for the frequency necessary to do the job. In particularly difficult bulk-material problems, as in moving carbon black from hopper cars, a peristaltic action can be had by installing several horizontal boots, one below the other, and injecting air into them in succession from the lowest up. This action will usually move even the most stubborn material. *Abrasion & Corrosion Engineering Co.*



30 HUMDINGER SELF-PRIMING CENTRIFUGAL PUMPS. The only components inside the volute case are the impeller and the seal. This new pump excludes every other possible wearing part contributing to the hydraulic and mechanical losses. The employment of twin coaxial volute passages results in a highly efficient volute design that makes possible greater capacity, faster priming, and more trash-handling ability. The 1½-in. centrifugal pump is rated at 5,500 gal. per hour. Shaft seal and suction check valve are made of positive-sealing, oil-and-gas resistant neoprene. A new principle of adjustment compensates for impeller wear without disassembling or replacing interior parts. No shims, wear plates, or replacement parts of any kind are required. Made is a complete range of size; 1½-in. (5,500 gal. per hour) to 10-in. (250,000 gal. per hour) the Humdinger is available with gasoline or diesel engines and electric or belt drives. Various mountings include skids, steel wheels, pneumatic tires, or trailer type. *Ralph B. Carter Co.*

IT'S NEW — CHECK IT

31 NEW PRESSURE SWITCH WITH VARIABLE ACTUATION VALUE. Meletron model 314 comes in six classes of proof pressures (to 500, 1,500, 3,000, 4,500 6,000 and 12,000 psi.) They provide accurate sensing of system pressures over an adjustable range of 15 to 10,000 psi. Suitable for liquid, gas, or water systems. The switch will actuate at any predetermined pressure over the adjustable range. Available with external adjustment if setting requires frequent changes. The variable actuation value ranges from 10 to 2,000 psi. depending on the switch class. Actuation may be on increasing or decreasing pressure, automatically reset by snap action of switch. Skeleton switches (Model 304) with the same operating characteristics but without case are also available. *Barksdale Valves.*



IT'S NEW — CHECK IT

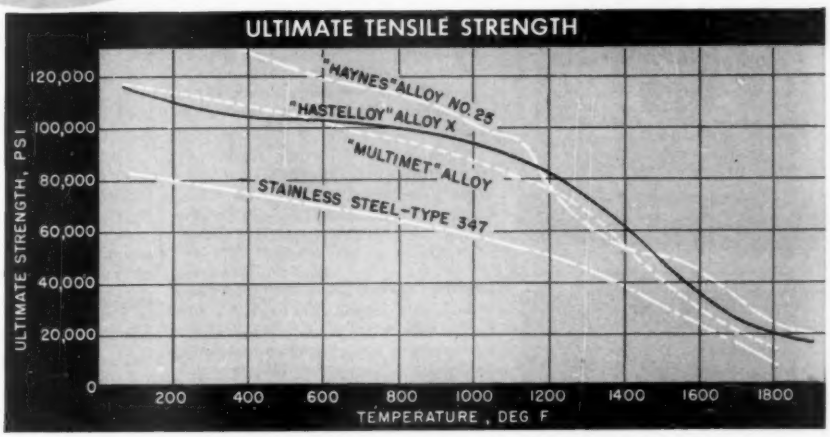
32 NEW AUTOMATIC SELF-CLEANING STRAINER. Made in 2 to 36-in. pipe-line sizes, the strainer removes fine suspended particles from raw or process water, and disposes of them in an automatic self-cleaning manner. Units are also constructed of special noncorrosive materials to strain sea water, ammoniacal liquor, gasoline, oil, and various other liquids. The strainer consists essentially of a rotating drum into which straining elements are retained. The drum is mounted on a vertical shaft and housed in a cast-iron body. Water or other liquid to be strained enters at the bottom of the housing and rises on the outside of the revolving drum. The liquid passes through the drum, while the dirt and foreign matter are retained on surface of the strainer elements. *S. P. Kinney Engineers, Inc.*

HASTELLOY
Trade-Mark
Alloy X

A New

"HAYNES" HIGH-TEMPERATURE ALLOY

High Strength at Elevated Temperatures
Excellent Oxidation Resistance
Low Strategic Alloy Content
Excellent Formability
Good Casting Characteristics



The excellent high-temperature properties of HASTELLOY alloy X—a new material that contains iron, nickel, chromium, and molybdenum—make this alloy a good choice for aircraft sheet-metal parts, such as cabin heaters, tail cones, and collector rings. It is also being tested for aircraft nozzle vanes, both precision-investment-cast and fabricated from sheet. In addition, it is designed for high-temperature applications in the chemical, petroleum, metal-producing, and heat-treating industries.

HASTELLOY alloy X has a relatively low content of strategic metals. Tests made so far indicate that alloy X has high-temperature properties comparable to those of other alloys containing a higher percentage of strategic metals (see graph).

The new alloy is available as sheet, plate, bars, wire, and precision-investment castings. For additional properties data, write to our General Offices in Kokomo, Indiana, for a copy of the new booklet "HASTELLOY Alloy X."

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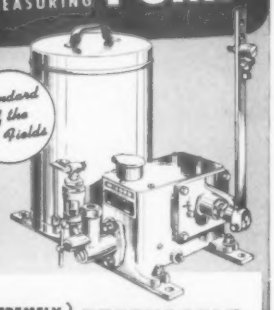
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PIPE LINES

Platte Starts Job

$3,000,000 extension to go into Big Horn basin

KANSAS CITY, Mo.—Platte Pipe Line Co.'s new $3,000,000 extension into the Big Horn basin of Wyoming is now under construction, Millard K. Neptune, president, reported last week.

The new extension consists of 38 miles of 12-in. pipe line from Byron to Oregon, Wyo.; and 59 miles of 14-in. pipe line from Oregon to the company's Chatham station. R. H. Fulton & Co., of Lubbock, Tex., has construction contract.

When completed the extension will permit Platte to serve directly the Byron and Oregon areas of the Big Horn basin.

Large amounts of crude are already being moved over the Platte line from Wind River basin, Great Divide basin, Casper-Glenrock-Sussex area, all in Wyoming; and the Denver-Julesburg basin of Nebraska and Colorado.

Recently opened . . . The company, owned by British-American, Continental, Ohio Oil, Pure Oil, and Sinclair, just recently put in operation its new $60,000,000 20-in. crude-oil line which is capable of moving more than 100,000 bbl. of oil daily from the Rocky Mountains to its terminus at Wood River, Ill.

Techniques Studied

Products lines discussed at A.P.I. pipe-line meet

KANSAS CITY, Mo.—Development of new methods for separating products in pipe lines was predicted at the recent pipe-line-products conference of the American Petroleum Institute here.

A future demand for the movement of smaller batches of a wider range of refinery products was anticipated. Furthermore, increased attention is being given to the possibility of laying smaller-diameter trunk-line laterals as trucking problems become more burdensome in metropolitan areas.

When a products line containing batched shipments is shut down, the pressure maintained during shutdown needs to be only sufficient for conditions of hilly terrain and for starting up movement quickly with turbulent flow.

Costs eyed . . . The total cost of laying piping aboveground at pump stations and tank farms was regarded as being similar to that of buried lines. Costs of concrete supports and provision for expansion were considered to be offset by costs of ditching, coating, and cathodic protection.

Stresses in piping due to the shifting and settling of tanks may be avoided by the proper installation of one Victaulic coupling aboveground and another Victaulic underground.

Wear on mechanical seals has been negligible. Operation without trouble for 16,000 to 20,000 hours of service was reported and 100,000-hour service was regarded as a reasonable possibility. Stopping and starting operations are the hardest for mechanical seals.

Proper provision for storage of centrifugal-pump impellers so as to avoid distortion was recommended.

The proposals of E. F. Morrill, president of Mid-Valley Pipe Line Co., for the modification of practices for buying right-of-way were regarded as constructive. Morrill favors a policy of procuring right-of-way at different rates of payment for different kinds of ground. Right-of-way policies should be decided at high levels for the most effective results, he said.

Hearings on Proposed El Paso Pipe Line Set June 1

WASHINGTON.—A $214,000,000 natural-gas expansion program will come up for hearing before the Federal Power Commission June 1.

Specifically involved in the commission's investigation are a proposed $179,725,000 pipe line to be constructed by El Paso Natural Gas Co. and facilities to cost $34,464,000 to be built by three companies which will take gas from the line.

The El Paso project would include 1,792 miles of pipe line and 161,860-hp. compressor capacity to permit the delivery of an additional 300,000 M.c.f. of gas per day from the Permian basin in Southeast New Mexico and West Texas and an additional 100,000 M.c.f. daily from the San Juan basin in Northwest New Mexico and Southwest Colorado for customers in Texas, New Mexico, Arizona, and California.

Consolidated for hearing with this application are applications of Pacific Gas & Electric Co., San Francisco; and Southern California Gas Co. and Southern Counties Gas Co., Los Angeles (see

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PIPE LINE SURVEYS

Natural Gas page). Pacific would take 100,000 M.c.f. daily of the 300,000 M.c.f. which El Paso would take from the Permian basin and 50,000 M.c.f. of the 100,000 M.c.f. to be taken from the San Juan basin. The Los Angeles companies, jointly, would also take 100,000 M.c.f. of the Permian basin gas and the remaining 50,000 M.c.f. from the San Juan basin.

At the same time the commission will hear El Paso's application for removal of restrictions imposed on its authorized San Juan and Permian basin pipe-line facilities limiting the maximum daily delivery to a total of 550,000 M.c.f., to Pacific Gas; 555,000 M.c.f. to Southern California and Southern Counties; and 20,000 M.c.f. to Nevada Natural Gas Pipe Line Co., Las Vegas.

Products Feeder Line in New Jersey Is Completed

BARBER, N. J.—A 6-mile, 8-in. petroleum pipe line from Barber (Perth Amboy) N. J., to Linden has been completed. The line has a daily capacity of 2,000,000 gal. Products will flow from California Oil Co.'s 65,000-bbl. daily Barber refinery and Shell Oil Co.'s marine terminal tank farm at Sewaren to the Buckeye Pipeline Co. products pipe-line station at Linden. The 6-mile line is owned by California and Shell.

Products from Linden will be distributed by the Buckeye system to terminals in the Allentown-Wilkes-Barre and Scranton, Pa., areas; the Binghampton-Syracuse-Rochester and Buffalo areas of New York.

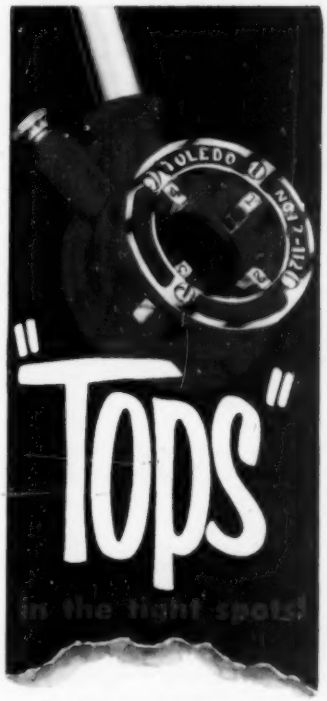
Service Pipe Line Seeks New Line in North Dakota

TULSA.—Service Pipe Line Co. has filed an application with the North Dakota State Public Service Commission at Bismarck for a certificate of convenience and necessity to build a new 170-mile pipe-line system from Tioga and Beaver Lodge pools of Williams County, North Dakota, to Mandan, site of the Standard Oil Co. (Ind.) 30,000-bbl. daily refinery.

Sun Pipe Line Undertakes Toledo-Detroit Carrier

TOLEDO.—Sun Pipe Line Co. is preparing for construction of a 50-mile, 8-in. products pipe line from Toledo to Detroit.

R. L. Coolsaet Construction Co. will start soon to lay the Michigan section. Poston Pipe Line Co. will begin work on the Michigan section in June.



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DIES OF FINEST TOOL STEEL. Precision-ground. Die segments can be reground when dull or replaced at small expense. Three models: No. 00—⅛" to ¾"; No. 11—⅛" to 1¼"; No. 12—½" to 2" pipe.

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DOLOFRAC is exciting news!

Oil men are honestly excited about NEW WESTERN DOLOFRAC. They're excited because Western Dolofrac is showing excellent results in obtaining production increases from dolomitic, limestone, and siliceous pays. Here's the story — Dolofrac treatments have brought SUBSTANTIAL production increases in EVERY WELL that had the potential capacity to produce at a higher rate.

Here's DOLOFRAC'S success formula!

Western Dolofrac is a viscous acid treating solution designed by Western research. It contains a strong acid solution, a gelling agent, internal breaker, inhibitor, demulsifying and other chemicals and a metered amount of sand particles. Western Dolofrac applies two actions that have been most successful in treating formations of this type — MECHANICAL FRACTURING and CHEMICAL REACTION. By COMBINING these two actions — DOLOFRAC has MULTIPLIED their effectiveness.

DOLOFRAC works for you four ways!

Each WESTERN DOLOFRAC treatment works four ways on

stubborn, low-permeability, sandy, limey or dolomitic pays: (1) Dolofrac

FRACTURES formations enlarging existing drainage channels and creating new ones. (2) Dolofrac DISSOLVES linestone and dolomite through ACID REACTION. Dolofrac's acid reaction has the added advantage of being RETARDED since acid will not react with formation rock until gel breaks. This means *deeper penetration* with LIVE ACID ACTION.

(3) Dolofrac SCRUBS fracture surfaces by the abrasive action of its sand load cleaning them of flow-slowing foreign materials and secondary deposits. (4) Western Dolofrac by sand grain deposit PROPS open flow channels greatly increasing formation permeability.

Western DOLOFRAC is versatile!

Dolofrac is being used very successfully in treatment of many low-permeability and low-solubility pay zones which differ widely in physical properties and characteristics. Western Dolofrac has been highly successful in COMPLETION treatments for new wells and in REWORK programs for old wells. And one of Dolofrac's major applications has been in stimulating GAS WELL PRODUCTION.

WESTERN REPRESENTATIVES WILL BE PLEASED TO SHOW YOU ACTUAL CASE HISTORIES OF WHAT DOLOFRAC HAS DONE IN MANY FORMATIONS VARYING WIDELY IN CHEMICAL AND PHYSICAL PROPERTIES.

DOLOFRAC

FROM "TIGHT" CALCAREOUS AND SILICEOUS FORMATIONS

DOLOFRAC gives extra protection!

Western Dolofrac treatments HAVE NO harmful "side effects." This is because: (1) Dolofrac contains an INTERNAL BREAKER which assures breakout independent of other breaking actions such as acid reaction, etc. (2) Dolofrac WILL NOT form harmful emulsions with crude oil. It contains a DEMULSIFYING chemical to prevent formation of damaging emulsions which cause slow cleanup.

LOOK AT THESE IMPORTANT DOLOFRAC ADVANTAGES . . .

1. Western Dolofrac treatments have never failed to bring IMPORTANT PRODUCTION GAINS where pay zones had additional productive capacity.
2. Western Dolofrac treatments have FASTER CLEANUP. Because of its chemical composition, Dolofrac forms no harmful emulsions with crude oil — SAVES expensive rig time. (In some areas, Dolofrac's cleanup time is several days less than required by other methods.)
3. Western Dolofrac has positive BREAKOUT. Because of its INTERNAL BREAKER, Dolofrac automatically returns to low viscosity (3 to 8 cps.) within a few hours, regardless of acid reaction or other outside breaking factors.
4. Western Dolofrac contains STRONGER ACID SOLUTION and has RETARDED ACID REACTION. Formation permeability is increased at greater distances from the bore hole, because acid does not react with formation rock until gel breaks. This means DEEPER PENETRATION with LIVE ACID ACTION.
5. Each Western Dolofrac treatment is DESIGNED INDIVIDUALLY to meet YOUR particular needs by experienced laboratory and field treatment engineers.

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Among the Drilling Contractors

Canadian Firm Gets Waskada Contract

Regent Drilling Co. has been awarded contract to drill a north offset to The California Standard Co.'s Madison oil discovery in the Waskada area of southwestern Manitoba.

The new test is Cal-Standard's 16-13 Waskada, LSD 16, 13-1-26w1, ¼ mile north of the discovery well, about 3 miles north of the United States boundary, and 24 miles east of the Saskatchewan border.

The Waskada discovery well, 9-13 Waskada, LSD 9, 13-1-26w1, drilled to total depth of 5,172 ft. and was plugged back to the Madison lime at 3,108 ft. To the end of January this year the discovery well had produced 2,707 bbl. of crude-oil. Company engineers hope to obtain more satisfactory production ratio at the new location.

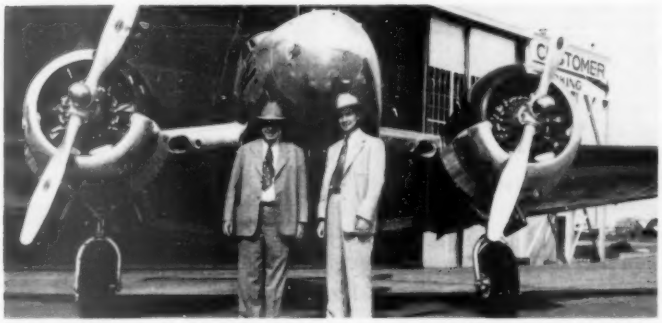
Kirkwood & Morgan Drilling Co., Corpus Christi, has contract for a 4,250-ft. wildcat in Goliad County, Texas, at Louis Haring, Hawn Bros. and Kirkwood & Morgan 1 P. T. Calhoun, on a 200-acre lease in M. J. Y'Barbo Survey, Abstract 51, about 2 miles northeast of Charco. The wildcat is located 330 ft. from the northerly south line and 330 ft. from east line of lease, scaling 2,300 ft. from west line and 8,600 ft. from north line of survey.

Christie-Stewart Drilling Co., Wichita Falls, Tex., drilling firm, has contract for a new wildcat in southwestern Yuma County, Arizona. Loy Turbeville & Associates are reported preparing to launch a new search for oil in that area, which is located in the Yuma Valley, between the Colorado River and the Gila Mountains.

Brown Drilling Co. is contractor for a new wildcat in Section 26-7n-5e, in the Elk Grove area of Sacramento County, California, south of the city of Sacramento, for E. A. Bender. The 7,000-ft. granite test is the 1 J. P. Kraemer.

Zephyr Drilling Corp., Tulsa, has been awarded contract for a new 6,500-ft. Springer sand test 4 miles north of Gotebo, about 2 miles northwest of North Gotebo Springer sand pool, Washita County, southwestern Okla-

Cook Purchases Company Plane



Standing in front of new twin-engine Cook Drilling Co. airplane are: Sam Cook, owner, left; Coleman Stripling, pilot, right.

Cook Drilling Co., Fort Worth, recently purchased a new twin-engine airplane to meet growing transportation needs resulting from the firm's expanding interests.

Sam Cook, president, and Coleman Stripling, pilot, took factory delivery on the 200-mile-an-hour Beechcraft Model 18 in Wichita.

The Cook firm is presently operating rotary rigs in Arkansas, Louisiana, Mississippi, Texas, Wyoming, and Montana, and anticipates operations in Canada shortly.

With the new plane, Cook reveals, he and his executives can make field trips to remote rigs in less than half the time it takes by commercial air lines and trains, often cutting as many as 4 days' travel time.

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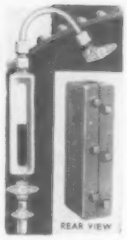

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homa. New operation is Huffman & Mallow 1 Sophia Hanza, NW SW SE 33-8n-16w.

Nowery Drilling Co., Inc., has been awarded contract and rig will be moved soon to San Juan Exploration Co.'s 1 Garrett, C NE SW 10-18s-15w, proposed 4,000-ft. Travis Peak wildcat in Union County, southern Arkansas. The test is 2 miles south and slightly east of El Dorado. There have been only shallow wells drilled within 1 mile of the well, all having small showings of oil in the Nacatoch sand. None went far enough to test the Travis Peak.

Sam Cook Drilling Co., Fort Worth, is contractor for The Murphy Corp. 1 Birtie, C SW NE 6-19s-18w, proposed 9,500-ft. Smackover lime test 2 miles east of Atlanta, Columbia County, Arkansas.

Wise Drilling Co. is contractor for Ralph Spence, Watson Wise and P. G. Lake (Tyler, Tex.) 1 R. J. McMillian, 660 ft. from north line, 330 ft. from east line of John Jones Survey, Abstract 330, Wood County, Texas. The wildcat is located 4½ miles southwest of Quitman in Wood County, East Texas. The wildcat will go to 5,300 ft.

L. B. Jackson has contract for Blackwell Oil & Gas Co., Cushing, Okla., at their 1 Scroggin, C SW NW SE 14-7n-16w, scheduled 4,000-ft. wildcat 7 miles northeast of Morrilton townsite, Conway County, Central Arkansas.

Butler-Johnson Service Corp., Shreveport, has been awarded contract for an 8,200-ft. test at Union Oil Co. of California and Sam Sklar 1 S. M. Caruthers, NE NW 22-21n-5w, proposed Cotton Valley sand test near Lisbon townsite, Claiborne Parish, Louisiana. The new spot is 2 miles west of production in the old Lisbon field.

ACTIVE ROTARY RIGS*

	Week ended 4-27-53	Change from week ended 4-20-53	Change from week ended 4-28-52
Gulf Coast	599	−11	+ 2
N. & W. Tex.-N. M.	801	−10	−244
Ark.-N. La.-E. Tex.	128	− 2	− 20
Oklahoma	322	−16	+ 7
Kansas-S. Nebraska	176	+ 3	+ 30
Illinois-Eastern	122	+14	+ 7
Rocky Mountain	214	+ 9	+ 26
Pacific Coast	169	− 1	+ 9
Total U. S.	2,531	−14	−183
Western Canada	147	+15	+ 7
Total	2,678	+ 1	+176

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States, West Texas-New Mexico, and Oklahoma-Kansas are shown on pages 199 and 200.

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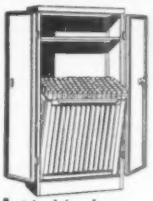

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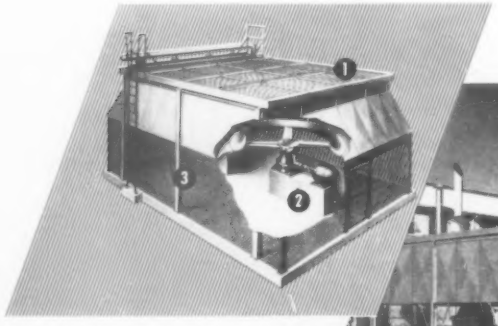

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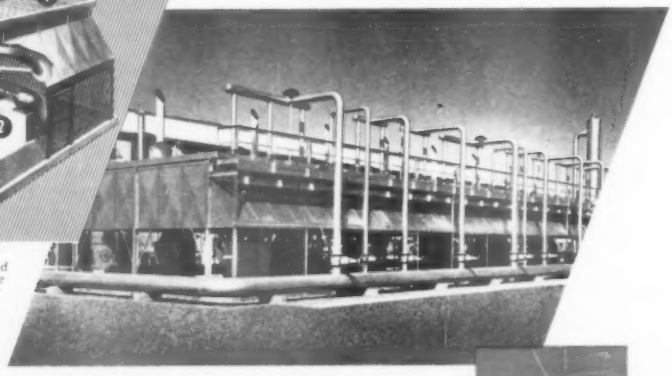

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NATURAL GAS

P.C.G.A. to Cover Proposed Revision of Piping Code

LOS ANGELES.—Proposed revisions in Section 8 of the pressure piping code will be thoroughly covered in one session of the annual gas-supply and transmission conference of the Pacific Coast Gas Association at Santa Barbara on May 13-14.

F. A. Hough, of Southern Counties Gas Co., will discuss problems inherent in the development of the code; Earl Parker, University of California, will cover the brittle fracture problem; "Quality Control During Pipe Manufacture and Construction, and Hydrostatic Testing," will be given by C. T. Schweitzer, Southern California Gas Co.; and changes in pipe-line-design procedures will be described by R. D. Smith, Pacific Gas & Electric Co.

Opening-session papers will be "Emergency Pipe-Line Stream Crossings," C. A. Sweningsen, Southern Counties; and "Ultrasonic Inspection for Internal Pipe Line Corrosion," by D. C. Erdman of Electro Circuits, Inc., and S. K. Gally of Southern California.

May 14 papers are: "What is Critical?" by A. W. Turner, Southern California; "Installation and Operation of Gas Turbine Stations," W. V. Holik, El Paso Natural Gas Co.; "Intake Air Cooling," F. R. Cramer, Southern Counties; "Suppression of Air Borne Pulsations from Compressor Engine Intakes," W. N. Lindblad, P. G. & E.; a mobile research lab for the petroleum and petrochemical industries, R. C. Baird, The Fluor Corporation, Ltd.; and "Positioning of Piston-Operated Valves," F. M. Partridge and G. C. Wilson of Southern California Gas Co.

More Natural Gas Sought For Southern California

LOS ANGELES.—Southern California Gas Co. and Southern Counties Gas Co. are seeking approval by the Public Utilities Commission of a plan to increase capacity of their jointly owned Texas pipe-line system to bring an additional 150,000,000 cu. ft. of natural gas daily into the state.

The companies estimate the facilities will cost about $7,500,000. Added gas would raise the total delivery capacity of the Texas pipe-line system to 705,000,000 cu. ft. daily.

The expected decline in natural-gas supply from California sources, combined with the extraordinary population growth here, has created the need for timely importation of additional gas from El Paso Natural Gas Co. to meet the market requirements of Southern California. The three companies are also seeking approval of the Federal Power Commission.

In an opening statement made before the commission, Milford Springer, company attorney, said, "This proposed additional natural gas from El Paso Natural will be much cheaper than any manufactured gas which would be required to take its place if the Southern companies do not acquire it."

El Paso Sulfur-Recovery Plant

Above is a view of the new sulfur-recovery plant of El Paso Natural Gas Co. near Farmington, N. M., during its late construction. One of the distinguishing factors of El Paso's operations is the handling of large quantities of residue and casing-head gas which is produced as an incident to oil production in the Permian basin. This operation includes gathering casing-head gas, compressing to suitable pressures for processing through natural-gasoline extraction plants, and sulfur-removal dehydration plants, finally going through compressor plants into main transmission lines at 500 to 825 psig. Most residue gas requires sulfur removal and dehydration as well as compression before entering the main lines.

Panhandle Eastern Gets O.K. to Operate Facilities

WASHINGTON.—Panhandle Eastern Pipe Line Co., Kansas City, Mo., has been authorized to operate a major portion of some pipe-line facilities built by Indiana Gas & Water Co., Inc., Indianapolis, to increase natural-gas deliveries to that company in the Crawfordsville and Lebanon, Ind., areas.

Approval came when the Federal Power Commission affirmed with modifications a decision by a presiding examiner, Edward B. Marsh, on February 26. The decision also authorizes Panhandle to sell certain other pipe-line facilities to Indiana Gas.

Panhandle plans to relocate its measuring and regulating stations for Crawfordsville and Lebanon by building new stations at points south of the old stations. Panhandle will then sell the facilities north of the new stations to Indiana Gas for $53,719.

The new facilities, built by Indiana Gas and to be operated mainly by Panhandle, include about 19 miles of 8-in. pipe line paralleling an existing lateral owned and operated by Panhandle between the latter company's main line and Crawfordsville, and approximately 13 miles of 6-in. line paralleling Panhandle's existing lateral line from its main line to Lebanon. The cost of these facilities was $567,893.

Natural Gasoline

Plant on Standby Basis

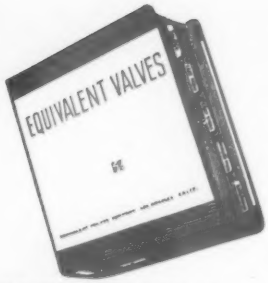
ARKANSAS CITY, Kans.—Cities Service Oil Co.'s gasoline plant is now on a standby basis, according to Frank M. Perry of Bartlesville, Okla., vice president in charge of gasoline and chemical operations.

The plant has ceased operations but will not be dismantled. It will be kept in readiness for possible resumption. Personnel is being transferred to other Cities Service plants, most of them going to new facilities at Blackwell, Okla.

Storage Permit Asked For Harris County, Texas

AUSTIN.—Ellis Transport Corp. has asked approval of the Texas Railroad Commission for an L.P.G. underground project in Harris County.

The firm said it plans to store the product in a salt section underlying portons of Section 52 of the James Hamilton Survey.



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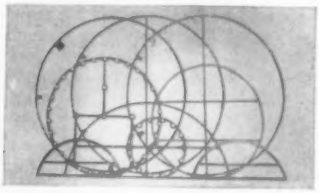

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REFINING

High Avgas Quality Permits Greater Fuel Economies

NEW YORK.—On the average, aviation gasolines available to commercial airlines in this country show considerably better quality than specifications require in antiknock and volatility characteristics. As a result, airlines can effect better fuel economies in cruise operation without significant engine modification.

These conclusions were reached at the Society of Automotive Engineers' National Aeronautic Meeting, in a paper entitled "Aviation Fuel Economy and Quality—Brothers under the Aircraft Skin." The authors were H. E. Alquist of Phillips Petroleum Co., Bartlesville, Okla.; E. A. Droegemueller, United Aircraft Corp., and H. N. Taylor, United Air Lines, Inc.

They outlined the mutual effort of aircraft operator, engine manufacturer, and refiner to assure satisfactory utilization of maximum-economy cruise-operation conditions. Although it appears that manual lean operation is more critical of fuel quality, particularly antiknock and colatility characteristics, it also seems that significant improvement can be made in cruising economy with the average 1951 production fuels.

This is possible because: (1) Partly through engine design the present cruise operating points are much further than necessary from the knock-limited powers available with some specification fuels; (2) because the average-production aviation gasolines since the war have been considerably better than the specification requires.

It would seem that for the longer-range aircraft an improvement of 5 to 7 per cent could be effected over best power - retarded spark - cruise settings, without significant engine modification.

Kellogg Gets Contract For Texaco's Amarillo Units

NEW YORK.—A multimillion-dollar contract has been awarded by The Texas Co. to M. W. Kellogg Co., in connection with the complete modernization of Texaco's Amarillo, Tex., refinery.

The over-all program will practically double the current capacity of the refinery. Other major processing equipment, in addition to that under contract to Kellogg, has also been scheduled. Cost of new equipment and revamping to complete the renovation is estimated at several million dollars.

Kellogg-designed units will include crude distillation, delayed coking, Orthoflow fluid catalytic cracking, and catalytic polymerization. The first two are integrated into a combination unit.

Approximate capacity in barrels per stream day of feed will be as follows: Crude distillation, 15,500; delayed coking, 3,600; cat cracking, 6,000 (about 10,000 with recycle). The poly unit is rated at 470 bbl. per stream day of polymer gasoline. Figures are based on processing of Panhandle crude although the refinery is designed also to handle Hockley crude.

The Orthoflow unit will be the tenth of this new type cracking unit to be erected or scheduled.

NELSON REFINERY CONSTRUCTION INDEX

Appears in the first issue each month.
Explanation—"News Items That Appear in Quarterly Cost Indexes," July 7, 1952, pages 105 and 106.
Compiled by W. L. Nelson—Petroleum Refinery Consultant—Tulsa.
Indexes of Individual Equipment Items—January, April, July, and October.

	1948	1949	1950	1951	1952	Jan. 1953
Pumps, compressors, etc.	127.0	135.9	138.2	155.9	155.6	156.0
Electrical machinery	127.6	130.9	134.9	154.3	152.4	151.5
Internal combustion engines	116.9	124.8	126.0	146.1	146.5	146.2
Instruments	120.0	122.0	127.8	142.3	146.2	148.1
Heat exchangers	130.0	133.0	140.0	152.0	165.8	169.4
Miscellaneous equipment average	*122.1	*121.6	*126.2	*145.1	153.3	154.2
Materials component	139.3	143.6	149.5	164.0	164.3	167.1
Labor component	128.0	137.1	144.0	152.5	163.1	169.7
Refinery construction index	132.5	139.7	146.2	157.2	163.6	168.7

*Used in computing the Nelson Index until April 1952. These are slightly different than the average of the Miscellaneous Equipment Items shown above.

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Catalyst Plant to Be Built

LOS ANGELES.—National Aluminate Corp. will begin construction this month on a new plant at South Gate for the production of mocrospheroidal grades of petroleum cracking catalyst.

Completion of the plant is scheduled for late fall, with full-scale production by next January 1.

Refining Brief

NEW YORK. — Lummus Co. last week announced it has been authorized to offer the new hydrodesulfurization process developed by Shell Oil Co. and is currently erecting a unit using that process for Shell at Stanlow, England.

Petrochemicals

Construction Under Way on New Superphosphate Plant

HOUSTON.—Construction is under way on Phillips Chemical Co.'s new triple superphosphate fertilizer plant at Adams Terminal on the Houston Ship Channel.

The plant will have a capacity of 405 tons per day of granulated triple superphosphate. Facilities will be integrated with those existing at Phillips' ammonium sulfate plant. Rust Engineering Co. has construction contract.

Ammonia Plant Under Way

NEW ORLEANS.—The $55,000,000 ammonia plant under construction for American Cyanamid Co., here, is expected to be completed in early 1954. The plant will produce in addition to ammonia: acetylene, sulfuric, and hydrocyanic acids and ammonium sulfate and acrylonitrile. Natural gas will be used as a prime raw material at the plant.

Site of the new facilities is on the west bank of the Mississippi River, about 12 miles upstream from New Orleans.

BISHOP, Tex.—Celanese Corp. of America is producing butanol at its petrochemical plant located here. Completion of a new unit at the company's plant has permitted the shipment of the alcohol, which is widely used in industry as a solvent and has found broad applications in ureas, alkyds, and phenolic adhesives.

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DESCO Lubricants are packed in convenient individual sticks in 6 sizes. 12 to 24 sticks to a carton. 6 cartons in a case. Write for catalog and prices.

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EXPLORATION

Optimism: A Key to the Williston Basin

by Philip C. Ingalls

AN optimistic approach to the problem of finding oil is as essential to a geologist as the ability to think in three dimensions. This is true whether the area under consideration is a lease or a province, whether that area is poked full of holes or without a test or somewhere in between.

Oil is found by digging holes. Holes are dug because someone believes that oil will be found in sufficient quantities to make the venture profitable. (It has been said that a man shouldn't call himself a geologist until he's seen dry holes drilled on 10 of his pet prospects. Obviously, that criterion is a test of a man's optimism, not his ability to find geologically perfect traps.)

Rocky Mountain geologists personify optimism. These geologists see great potentialities for each of the sparsely tested basins of their vast province. The most obvious example of their optimism, however, is in their outlook toward the newest and biggest basin of them all, Williston.

At the Casper meeting of the Rocky Mountain Section of the American Association of Petroleum Geologists, the Williston basin was discussed layer by layer. Each report, though lamenting the paucity of holes, spelled out confidence in the basin's oil-producing capabilities.

It was pointed out by John Paul Gries that 50 per cent of the footage drilled within the Williston basin is in Cretaceous rocks; and yet, except for using a few beds for structural control, very little attention is being paid to these rocks which offer the following prospects for oil and gas production: Fall River or Kootenai sands on any structural highs in eastern Montana; Newcastle sandstone in stratigraphic traps on the flanks of the Black Hills; tongues of "true" (Northeast Nebraska type) Dakota sandstone pinching out updip on the west flank of the Lemmon syncline in western South Dakota; and Eagle and Judith River sands on untested highs along the Cedar Creek anticlinal trend and in possible pinchouts near the Dakota-Montana line.

Sample studies by Donald Towse indicate that Sundance sandstones and Piper limestones of Jurassic age have porosity development that could well reservoir oil on structures in the United States portion of the Williston basin just as their equivalents have in Wyoming and Saskatchewan.

Mississippian rocks have been found the most important in the Williston basin to date. An estimated 200,000,000 bbl. of oil has been proved in Mississippian limestones, nearly 130,000,000 bbl. of which is on the Nesson anticline in North Dakota. H. Mack Cox's prediction that more than 500,000,000 bbl. of Mississippian reserves will have been proved by the end of 1955 is based on the variety of favorable reservoir characteristics of Madison and Charles pools (fractured limestone, granular-type limestones with pin-point porosity, and fossiliferous, vuggy limestones within rich source beds) and the fact that accumulation is not dependent on large amounts of closure.

The complex history of the Devonian in the basin was reviewed by Andrew D. Baille, who pointed out that the basin during Devonian time was a southern arm of a restricted sea which ran across Canada to the Arctic Circle. Baille divides the Devonian into four lithologic units. The uppermost unit consists of an assemblage of red argillaceous silt-stone and dolomitic shales in the east and becomes anhydritic in the west. Shelf-type carbonates predominate in the two middle units with the upper of the two containing two persistent fragmental and reefoid members. The lowermost unit has a thick deposit of evaporites (up to 600 ft.) in the center of the basin area and an erratic distribution of biohermal-type reefs on the shelf area in Saskatchewan.

Silurian rocks, producing on the Cedar Creek anticline and found productive in several deep tests on the Nesson anticline, offer excellent possibilities for additional production. These rocks, discussed by Miles T. Rader, Jr., are still best known at their outcrop areas in the Big Horn Mountains of Wyoming and in southwestern Manitoba, 500 miles apart.

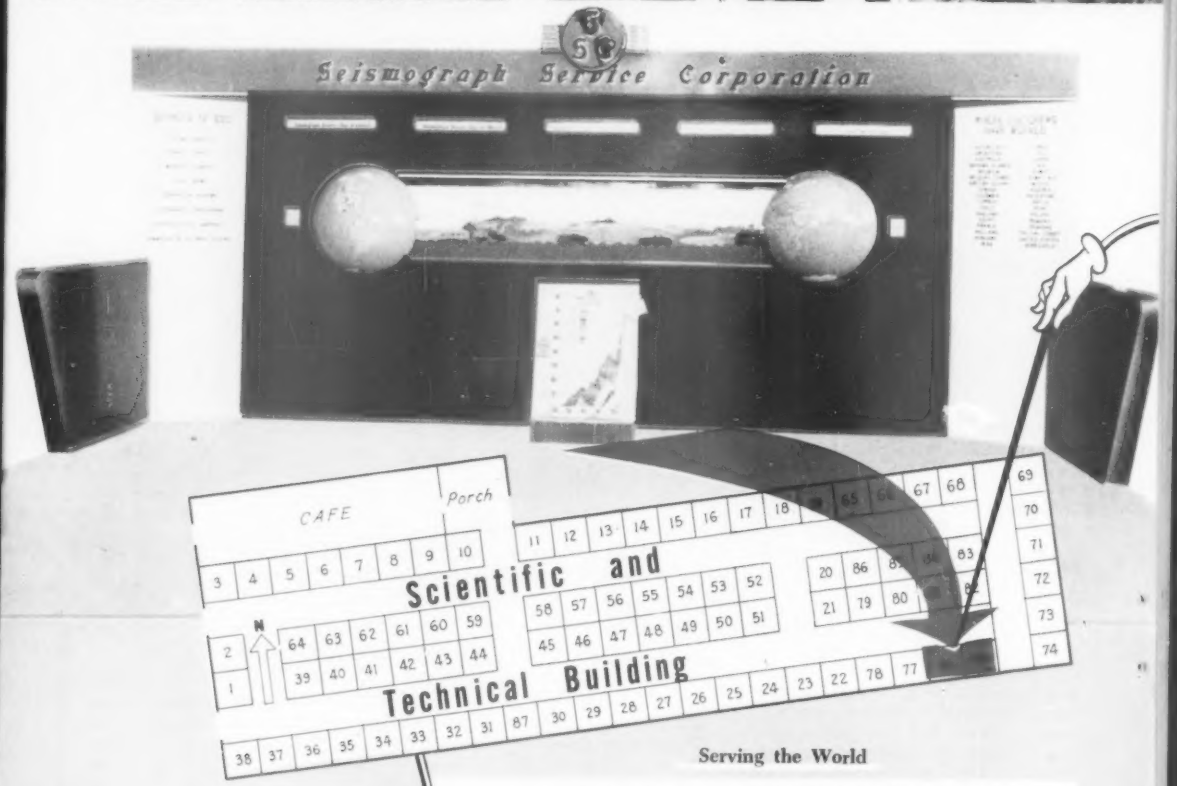
Production has been found in the Ordovician rocks on the Cedar Creek anticline and recently indicated by a wildcat 45 miles east of Richey field and in another in the northwest corner of South Dakota on the extension of the Cedar Creek trend. Paul J. Lewis showed that zones in these difficult-to-correlate rocks have excellent reservoir characteristics in the few areas where they are known to date.

Geologists have been pouring into the Williston basin during the past 2 years. Give them a little time and their concentrated efforts, spurred on by their optimistic thinking, will turn the Williston basin into a significant oil-producing province.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

SOUTH DAKOTA . . . The first significant shows of oil in South Dakota are reported at Carter Oil Co. 1 Hendricks, C SW NW 2-20n-3e, in the Gallup area of Harding County, 32 miles southeast of production at Little Beaver, Fallon County, Montana. A first test from 8,364-73 ft. in the Ordovician recovered 10 ft. of heavily oil and gas-cut mud, 40 ft. of slightly oil and gas-cut mud and an estimated pint of free black oil of low gravity.

COLORADO . . . Mountain Fuel Supply Co. has announced a gage of 8,770 M.c.f. of gas per day at 6 Allen, NE NW SE 33-12n-97w, in the Powder Wash Unit, Moffat County. The well produced from Lance (?). The discovery is of interest as a further addition to gas reserves in the important northwestern Colorado-southwestern Wyoming area.



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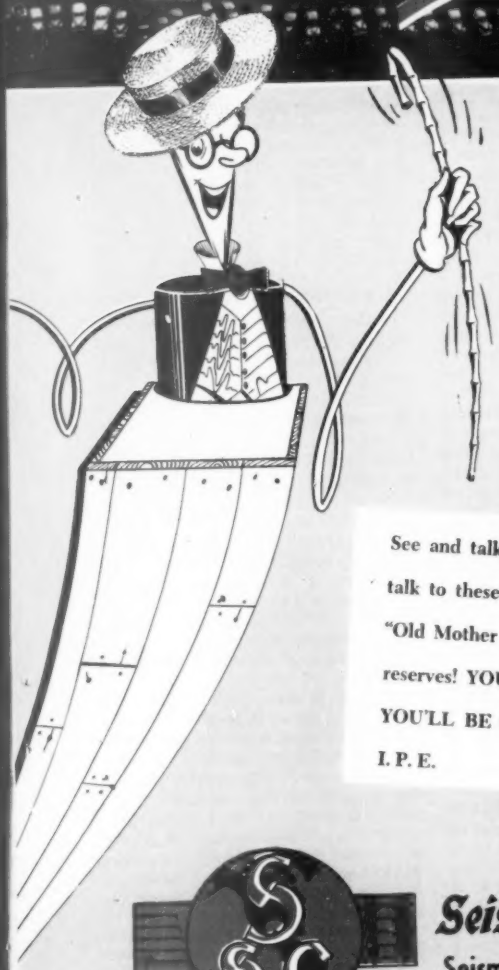

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There's No Easy Road to Oil Finding

"If new oil is to be found, old ideas must be reexamined. Retain the good ones, but use new ideas and new data within limits. No one method, no single theory, covers the field."

by Dorsey Hager*

EVERY oil operator would like to know of a sure-shot method for discovering oil, but with all the modern scientific developments in geophysics and in geology there is only one known method and that is the drill.

DORSEY HAGER.

Even in drilling, gas and oil fields have been nearly bypassed and only found by hunch or perhaps by experienced drillers or operators who, despite core analyses; gamma, neutron, and electrical logs; and drill-stem testing, took a chance on oil showings or testing zones where losses in circulation indicated permeability.

Geologists can with assurance keep an operator from starting a hole in granitic or highly metamorphosed rocks. They can advise against drilling in places where the stratigraphic columns are unfavorable, especially where great thicknesses of conglomerate limestones, sandstones, or shales without sandstones or porous limestones are known. However, no geologist in a new area of sedimentary rocks can tell in advance what may happen downdip a few miles from outcropping beds. Geological and geophysical criteria are very valuable, but gas and oil fields have been found in areas once considered unfavorable by the majority of the geologists.

Every new area must be classed as unknown until tested, and geologists can safely turn down the majority of wildcat holes on the law of averages. However, if there is any chance or geological excuse for gas or oil being found, encouragement should be given any operator who undertakes a test in a new area. The information gained from dry holes may prove very valuable in determining future possibilities as they assist in evaluating the geologic sections and in determining subsurface geology.

More and more we are being forced to the conclusion that oil, like gold, is where you find it. There is always a sound reason for its presence once it is found, but before finding it there were probably many more reasons against it.

There are numerous recent examples of gas and oil being found in areas once considered unlikely. The Clear Creek gas area on top the Wasatch Plateau and the Uinta basin oil fields, both in Utah, are classic examples. In California Cuyama Valley field was not favorably considered until a small wildcatter discovered the first oil—a small producer which led to a careful study of the area by Richfield Oil Corp. and resulted in an oil field. The recent discovery of commercial oil in Washington came after many years of exploration and should result in other fields being opened. Renewed activity in Nebraska and in eastern Colorado opened new oil fields after early discouragements.

Beware of Hypotheses

One must be careful of riding geologic hypotheses too hard. There is a school of environmentalists among geologists that holds that deep marine beds are unfavorable for oil. It is recognized that the most favorable environments are enclosed shallow seas. However, recent studies of marine sediments show that sands in places are found many miles farther out from the shores than was postulated earlier. When such sands were deposited in earlier geologic epochs, later arching of the deeper marine beds might cause migration from near-shore beds into the offshore sands with the result of an excellent gas or oil reservoir.

Areal studies especially paleogeological maps are most valuable in prospecting. In preparing such maps surface and subsurface data are very important. A few unsound or sketchy correlations can, however, upset the whole study. Able geologists using the same data may differ markedly in their conclusions, and numerous test holes may be needed to supply the answers. Hypotheses may look good but until the drill supplies the answers, any new area is an unknown quantity. Geologists have often had to change their opinions in light of new data.

Few geologists in advance of drilling would have predicted the great Kutz Canyon and related gas areas where lenticular sands account for the gas accumulations. Two other great gas areas, Hugoton, Kansas, and Cut Bank, Montana, are due to stratigraphic traps. The Spraberry sand of West Texas which covers 2,000,000 acres is an example of a widespread stratigraphic condition that might be found at other places, but only drilling could define such fields.

Emphasis on Reef Limestones

Recent emphasis on production in reef limestones in Canada and in West Texas has resulted in an active search for such traps. Seismic studies have proved of value in finding reefs where the height of the reefs is marked but in places of low relief results prove most doubtful. This also follows for unconformities, especially where the angle of the beds is very low or practically conformable.

Oil is found in fractured Mancos shales at Rangely, Colorado, at Florence, and in the Monterey shales at Santa Maria, California, but the new emphasis on fractured shales as reservoirs is largely due to oil discoveries in the fractured Green River shales of Utah.

Changes in thought about reservoirs are nothing new. Only 30 years ago Texas and Oklahoma oil producers had little regard for production from limestone reservoirs. "Too spotty, production declined too fast." This was largely due to history in the Trenton limestone area of Indiana and Ohio and in North-Central Texas. However, Pecos field and other West Texas fields in West Texas soon changed such thinking.

The search for stratigraphic traps is an active one, but good fields still result from surface geology. The Nesson anticline in North Dakota is a defined surface feature outlined by geologists in the 1920's and earlier. Prior to that time the Bowdoin dome, Poplar dome,

*Consulting geologist, Salt Lake City.

and the Cedar Creek structures were known. Recent activities have developed large wells on these features. Surface and subsurface geology in finding structural features still holds an important place in gas and oil exploration. When augmented by geophysics it is of major importance.

Structural traps still remain the dominant features sought in exploration, but stratigraphic traps are becoming more important. However, it requires many "strat" tests and numerous "dry" holes to delineate stratigraphic traps, and all operators are seeking less expensive methods. Perhaps some day some geophysical device will enable us to definitely outline an oil pool in advance of drilling. It would prove a great boon to the oil operator and would cure the many headaches caused by dry holes.

Reexamine Old Ideas

Geological thinking is often influenced by the operator's attitude. It is difficult to buck against the prejudices of some hard-headed operator whose limited experiences have cost him money. He doesn't want to experiment. However, progress is seldom made that way. If new oil is to be found, old ideas must be reexamined. Retain the good ones, but use new ideas and new data within limits. No one method, no single theory covers the field. Finding oil is hard and expensive work.

Exploring for oil demands constant revision of earlier ideas. Oil men comb old areas for prospects that may bring in extensive fields or drill to deeper "pays" in old fields, but many new gas and oil fields must be found each year to fill the demand. Some day there will be a limit to the finding of new gas and oil fields, but that time is certainly not yet in sight. It is becoming increasingly difficult to find new fields and any new technical device that improves efficiency is welcome, but even with the latest devices, no method is fool proof. Moreover, one must not discount a driller with a good nose and keen imagination nor the sound production man who visualizes a possible well in what others may consider a hopeless prospect.

Judgment and experience—the human equation—still count in the opening of gas and oil fields. Geologists and petroleum engineers sitting on wells sometimes underestimate the acuteness of the practical men. Many of those men are not just "hole makers." They have accumulated rich funds of experience that many times prove useful and valuable. Without the full cooperation of such men, oil finding, dependent alone on technical advice, would prove a far more difficult task than it is today.

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KANSAS

Possible Pool Opener Indicated in Norton

A new oil pool is indicated at Jones, Shelburne & Farmer 1 Peak, SW SW SW 35-4s-22w, 7½ miles northwest of West Ray pool in the southeast corner of Norton County.

The well was gaged for about 3 bbl. of oil per hour during a 10-hour swab test. Testing continues at the wildcat.

The indicated new discovery is located in sparsely-productive Norton County at the extreme northern end of the Central Kansas uplift producing area. Norton County has seven small producing areas. Only one successful oil well was completed in the county in 1952, and so far this year very little activity has been noted. Norton County adjoins Furnas County, Nebraska, which has no production as yet.

New Pool in Pawnee

Westgate-Greenland is moving in cable tools for testing at a new discovery indicated in Pawnee County at 1 Koelsch, SE NE NW 32-22s-15w, 1½ miles southwest of Dunes pool in the southeastern part of the county.

Drill-stem test at 3,714-40 ft. in the Lansing recovered 30 ft. of oil-cut mud, 180 ft. frothy oil, 60 ft. clean oil and 180 ft. of heavily oil-cut mud.

New Pool in Rooks

Continental Oil Co. recently opened a new oil pool in northern Kansas Rooks County on the Central Kansas uplift. The discovery well, 1 C. E. Allphen, was completed at 3,736 ft. in the Arbuckle lime with initial production of 496 bbl. of 30°-gravity oil per day. The new discovery is located about 15 miles southwest of Plainville, Kans.

Elsewhere on the northeast flank of the Barton arch Long Bros. have a new wildcat under way at 1 Shaw, CN½ NE NW 10-6s-19w, 6 miles northeast of Slate Creek pool in the northern part of Rooks. In Osborne County Sohio Petroleum Co. has a new wildcat at 1 Kreft, SW SW NW 22-9s-15w, 5½ miles north of Ruggles pool and 3½ miles

Arrow indicates a new deep Morrow sand oil discovery in western Meade County, 3 miles west of Novinger pool, and 2½ miles east of Seward County's Kismet pool. The possible new discovery is Columbian Fuel Corp. 1 Meyer, C SW NE 20-33s-30w. The wildcat is located in an important wildcatting area of the Hugoton embayment, where Columbian recently had a new Morrow sand gas discovery in the East Kismet area of Meade County.

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east of Rooks County's Laton pool. Out into the southwestern part of the Salina basin in Lincoln County D. D. Dunlap has a rank wildcat about 38 miles northwest of nearest production in Russell pool. The new wildcat is 1 Snyder "D," NW SW SE 30-10s-10w.

NEW MEXICO

SOUTHEAST NEW MEXICO

Rank Wildcat Moving In Cable Tools

Kewanee Oil Co. 1 Four-Mile Unit, 26-18s-18e, Chaves County wildcat 40 miles southwest of Artesia, had total depth at 6,572 ft. and was moving in cable tools after losing considerable circulation.

This well attracted interest when it reported a drilling break between 6,541-46 ft., and drill samples from the Fusselman had good porosity, good to fair oil stain and good odor. A drill-stem test from 6,536-56 ft. developed 30 ft. of mud with no shows.

Importance of the well is its location within a geological province which has had little drilling. Nearest Permian production is 50 miles east in the Artesia field, and nearest pre-Permian production is 70 miles to the northeast, in Siluro-Devonian rocks.

Formation tops in 1 Four-Mile Unit are: Drinkard, 2,340 ft.; Abo, 2,990 ft.; Pennsylvanian 4,940 ft.; Mississippian, 6,110 ft., and the Fusselman at 6,541 ft. Elevation is 5,180 ft.

Northern Chaves County has a new wildcat operation at Forest Oil Corp. 1 General American-Federal, drilling ahead on 9,100-ft. contract. Location in 7-7s-31e is 8 miles northeast of the Lightcap field.

Lea County . . . Sun Oil Co. 1 Harper-Federal, Delaware Basin test, was drilling ahead in lime and chert at 14,636 ft. Last marker reported was the Strawn, at approximately 13,135 ft.

Continental Oil Co. 15-Q State, 1½ miles southwest of the same firm's prolific Anderson Ranch Unit, Devonian discovery, had a show of oil in the Wolfcamp. Drill-stem test at 9,840-9,900 ft. developed a blow of gas and recovered 510 ft. of heavily oil and gas-cut mud.

North of the Anderson Ranch discovery, Texas Pacific Coal & Oil Co. 1 Lane Mill Unit was drilling below 12,989 ft. This well was reported some 300 ft. high, on the Mississippian, to the same marker in the Anderson Ranch well.

Kewanee Oil Co. 1 Four-Mile Unit, an Ellenburger test which had oil shows in drill samples in the Fusselman section (Silurian). Location was made on the basis of surface and subsurface studies. Geologically, the wildcat is located on the juncture of the Y-O fault and the Huapache Monocline.

TEXAS

WEST TEXAS

Devonian Well Completed In Magutex Field

Magnolia Petroleum Co. 1-36996 University, southwest offset to the field discovery, has been completed as the first Devonian producer in the Magutex-Ellenburger field of northeast Andrews County. The field discovery flowed heavily from that formation but drilled ahead and completed in the Ellenburger.

Potential test on the Devonian well was 406 bbl. of 43° oil a day through 12/64-in. choke, from perforations at 12,504-58 ft. Nearest Devonian oil is Humble Oil & Refining Co.'s 1-Q University, to the east, in Section 15.

Northwest of Magutex, Northeast Andrews field gained a Devonian well south of the field discovery, at The Texas Co. 1 AE State. A drill-stem test from 12,531-67 ft., using 2,000 ft. of water blanket, had flowing oil in 24 minutes. A 2-hour gage through ⅝-in. choke tanked 268 bbl. of oil.

In northeastern Andrews County, Anderson-Prichard Oil Corp. 1-E University flowed Ellenburger oil on drill-stem test from 13,447-505 ft. A 1-hour gage tanked 81 bbl. of 46° oil, with no water.

This well has attracted considerable interest, being an old dry hole at 5,886 ft. It recovered free oil on drill-stem test in Dean sand, and flowed 32 bbl. of oil an hour from the Devonian. Formation tops were: Devonian 12,326 ft., minus 9,332 ft., and Ellenburger at 13,479 ft., minus 10,485 ft.

The Ellenburger top was figured 275 ft. high to the same marker in Continental Oil Co. 1-8 University, 2 miles to the southeast. The latter test had water with no shows in the Ellenburger.

Southeast of Andrews, Continental Oil Co. 1 McCullum, an Ellenburger wildcat, had flowing oil on drill-stem test of the Wolfcamp from 8,690-8,792 ft. Oil reached the top in 1 hour and 25 minutes, cleaned into pits for 30 minutes, then tanked 26 bbl. of 40° oil in 1 hour. A second test from 8,792-8,826 ft. recovered 4,032 ft. of oil but did not flow.

Reagan County . . . The Texas Co. 1-AF State, Fusselman gas-distillate discovery in the Big Lake-Ellenburger field, completed for a daily potential of 254 bbl. of 72° oil a day, plus gas at the rate of 9,740,000 cu. ft. Production was through 1-in. choke on perforations at 9,442-54 ft. The 1 AF State was dry in the Ellenburger.

SOUTHWEST TEXAS

Open Flow Potential Run At Monte Christo Strike

Superior Oil Co. has run open flow potential test at 1 Flora I. Johnson, discovery well of the new Monte Christo gas-distillate field 16 miles north of Mission, Hidalgo County. The discovery well was gaged for 26,500 M.c.f. of gas per day from perforations at 6,340-50 ft. The gas-liquid ratio is 160,000:1, gravity of the fluid being 55.3°. Total depth at the 1 Johnson is 11,051 ft. Superior is drilling 2 Johnson, 2,640 ft. north and slightly east of the 1 Johnson in the Tex-Mex Survey 203, Abstract 124. The test is slated for 11,500 ft.

Webb Discovery Prepares For Open Hole Completion

Webb County has a new oil pool 3 miles southwest of Billings field at Hawn Bros. and associates 1 Nancy de Spain. Operators are preparing for open hole completion test after a drill-stem test recovered 120 ft. of pipe line oil at 2,597-2,605 ft. The 2 de Spain will be drilled 933 ft. to the southeast of the field opener.

New Pay in East Edinburg Field is Gerber Sand

A new pay discovery in Hidalgo County's East Edinburg field has been completed at Union Producing Co. 1 Carl Gerber, 3,780 ft. south-southwest of the field discovery well. The new strike tested 4,400 M.c.f. of gas per day open flow from perforations at 7,084½-7,104½ ft. in the Gerber sand. Gas-liquid ratio is 169,000:1. Gravity of the fluid is 57.1°. The new pay is located in the J. J. Trevino Survey, Abstract 221, 4 miles north of Donna, Tex.

Third Test Staked in Mills Bennett Field

The Mills Bennett Estate has staked location for a third test on the 39,972-acre Mills Bennett Fee, 12 miles southwest of Falfurrias, Brooks County, at 3 Fee in the Palo Blanco (Ysidora Guerra) Grant, Abstract 258, 466 ft. from southeast line of grant, 933 ft. west and north of 1 Fee, oil discovery and 1,320 ft. northwest of 2 Fee, currently testing.

Perforations will be made opposite the "E" sand at 4,658-68 ft. at 2 Fee, 933 ft. south and west of the field discovery well. An open-hole drill-stem test from 4,406-13 ft. (opposite the "D" sand) recovered 1,000 ft. of pipe-line oil.

TEXAS GULF COAST

Northern Harris Has New Pool Opener

Northern Harris County has a new oil strike at The Federal Royalty Co. 1 W. L. Schweinle in the Wm. White Survey, A-829. The operator found production from 5,538-41 ft. The well is producing through a 12/64-in. choke at the rate of 121 bbl. of 39.2°-gravity oil per day. The new discovery is located about 1¾ miles north-northwest of oil production in new East Hufsmith field.

Victoria County Gas-Distillate Discovery Testing First Wilcox

A new indicated gas-distillate discovery 4 miles northeast of Nursery in Victoria County, and about 4½ miles southwest of production in Helen Gohlke field, is testing through perforations at 8,599-8,609 ft. opposite the first Wilcox. The wildcat is Arnold O. Morgan 1 R. H. Welder.

North Buna Field in Jasper County Has Third Producer

New North Buna field in Jasper County has a third producer being completed at Ada Oil Co. and Hurt Oil Co., Ltd.'s 2 Hardy Richardson, 1,320 ft. north of the field discovery well, 1 Richardson.

The well is flowing at the rate of 7 bbl. of 37.6°-gravity crude oil daily from perfora-

tions at 7,213-18 ft. The field was opened in January for a flow of 183 bbl. of oil daily, while the second well gaged only 38.1 bbl. daily. Ada and Hurt have announced a new location for the area, the 3 Hardy Richardson et al, 933 ft. west and north of the discovery well.

NORTH TEXAS

Flush Well From Shallow Pay

Further Ellenburger exploration in the Cooke County regular field, 9 miles northwest of Muenster, has added a second well in that pay, and from a deeper section.

L. W. Powell 2-B W. F. Solomon was reported to have flowed 264 bbl. of oil in 6 hours through ¼-in. choke, from pay around 1,703 ft.

Nolan Extension Flows

Sun Oil Co. 1 Shaw, 1-mile stepout to the Rowan and Hope field of Nolan County, gaged 220 bbl. of oil in 20 hours, through ¼-in. choke, from perforations in Pennsylvanian reef at 6,196-6,212 ft. Testing continued.

Montague County . . . Martin Wunderlich 2 J. D. Thweatt, wildcat 5 miles east of Bowie, completed as a Viola limestone discovery. On production test the well flowed 169 bbl. of oil a day from open-hole section at 6,687-6,700 ft., through 18/64-in. choke.

Shallow pay indicated . . . A possible shallow producing sand is indicated at Howell, Holloway & Howell 2-A Hutchinson, Grayson County wildcat 11 miles northwest of Gordonville in the Samuel Stewart Survey, A-1069. Drill-stem test of a sand from 2,423-43 ft. had gas in 19 minutes and recovered 1,000 ft. of heavily oil-cut salt water. Operators were drilling ahead, but estimated the well to be good for up to 25 bbl. of oil daily.

CALIFORNIA

Sunray Scores New Gas Find in Glenn County

Sunray Oil Corp. was in process of completing a Glenn County wildcat, northern Sacramento Valley, which promised to open a new gas field. Casing had been set at 3,673 ft. after the well flowed at the rate of 8,700 M.c.f. daily on a ½-hour formation test at 3,598-3,673 ft. Flow was through a ½-in. choke.

The wildcat, 1 Estes, is in NW NW 10-19n-1w, approximately 3½ miles northwest of the two-well Afton field. The latter was discovered by Richfield Oil Corp. in 1944, with gas coming from the Capay (Eocene) at about 2,650 ft.

Lost Hills Activity

General Petroleum Corp. was preparing to start a ½-mile northwest step-out to Tide Water Associated Oil Co.'s recent field discovery 5 miles northwest of Lost Hills field, Kern County. The new test will be 1 J. D. Martin in NE NE 18-25s-20e. Tide Water 14-17 Farnsworth, in SW NW Section 17, was completed flowing about 100 bbl. daily of 19°-gravity crude from 2,728-68 ft.

In Lost Hills field, Superior Oil Co. was

in process of completing 2 T.O.L. as a north offset to No. 1 T.O.L. in SW SE 12-26s-20e. General Petroleum was preparing to start a southwest offset to the new pool discovery.

Standard of California was continuing to drill ahead at its deep test in Section 29, which on a formation test at 6,034-6,138 ft. indicated would open oil production in the Carneros zone of Lower Miocene age. The test, 16 "Well," was last reported nearing 7,000 ft.

New Gas Wildcats

Union Oil Co. has staked location for a wildcat 6 miles west of the town of Lodi in the East Islands area of San Joaquin County. The test will be 1 Union-Brazos-Cotta in SE NW 2-3n-5e.

In the Robbins area of Sutter County, 14 miles northeast of Dunnigan Hills gas production, Standard Oil Co. of California was under way with 1 Rossi. Location of this test is in NE NE 15-12n-2e. Standard also staked 1 E. C. Dwyer in the Winchester Lake area of Yolo County, in SW 21-7n-4e.

APPALACHIAN AREA

OHIO

Efforts to extend the old oil pool in the western part of Perry Township, Coshocton County, have been fairly successful. Hulse and Kundtz 5 John Mossholder, Section 6, an outside offset, logged Clinton sand at 3,097-3,148 ft. with a show of oil that increased to 100 bbl. per day after Hydrafrac.

In Mt. Zion pool in Jackson Township, Knox County, Mid East 6 Gladys Griffith, Section 17, made 200 bbl. in 24 hours after a 150-qt. shot; and Mid East 5 Bertha Montgomery, Section 23, made 135 bbl. in 24 hours after a 120-qt. shot.

In New Castle Township, Coshocton County, National Gas extended the new Reese pool a location to the south with a small producer on 3 Earl Hughes, Section 12. Clinton sand at 3,193-3,240 ft. flowed 40 bbl. per day after Hydrafrac.

Mid West Oil Co. completed its 4 Guy Van Winkle, Section 24, Jackson Township, Knox County, as a 100-bbl. producer. Clinton sand at 2,915-75 ft. made a good show of oil natural, and was shot with 150 qts.

Ohio Fuel Co. extended the new gas pool west of Ewing ¼ mile to the south with a gasser on 1 Wyckoff-Kitchen, Section 9, Washington Township, Hocking County. Clinton at 2,626-53 ft. gaged 625,000 cu. ft. natural.

In La Grange Township, Lorain County, Ohio Fuel Co. 1 Frank Cvetic, Lot 54, topped the Clinton at 2,434 ft. and at 2,442 ft. gaged 875,000 cu. ft. natural.

MICHIGAN

Shallow Traverse Area in Van Buren Holds Spotlight

The shallow Traverse area in Van Buren County copped the news headlines this week as a 1,172-ft. wildcat well in Porter Township was continuing to produce from 120 to 150 bbl. of oil a day, pumping and flowing, after being acidized with 1,000 gallons almost a week previously.

This new discovery (or major extension of Lawton field, discovered in 1939) was the W. D. Gannett & Norman L. Stevens 1 Spencer & Spencer, NW SE SW 8-4s-13w. Top of Traverse lime objective was logged at 1,170 ft. Production was increased from six bailers of free oil and two bailers of water, which showed natural in 45 minutes, to 5 barrels of oil and about 1 barrel of water an hour, pumping and flowing after the acid treatment. In less than 4 days after the treatment 465 bbl. of oil had been sold from this new well. Tests of the crude oil from this new well indicated that it was a 41°-gravity oil, an excellent type crude for oil found at this depth in this area of southwestern Michigan.

Stevens had three new locations staked in the vicinity of this new well and a small rotary was being moved in to set drift strings on these next three wells. Two of these new starts were for offsets to the 1 Spencer & Spencer, the west 10-acre offset in the NE SW SW 8-4s-13w, and the north offset in the SW NE SW 8-4s-13w. The third start was staked across a 40-acre lease due north of the producer in the SW SE NW 8-4s-13w.

This new producer is located just short of a mile northeast of the 1952 extension of Lawton field. Norman L. Stevens controls a block of about 1,000 acres around the new well which he farmed from W. D. Gannett who owns an overriding royalty interest in the entire acreage spread. Actually, the 1 Spencer & Spencer may not be the discovery (or extension) well in this area. It offsets another test, the 1 Tauber, SE NE SW 8-4s-13w, which is still under test in the Traverse, with indications that it may be completed as a producer and thereby gain discovery rating.

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MONTANA

New Glendive Area Pool Indicated

Williston Oil & Gas Co. has indicated a possible new pool opener in the Glendive area of the Cedar Creek anticline in Dawson County, Montana, at 1 Entzel, C NE NE 18-14n-55e. The wildcat recovered 2,700 ft. of clean oil on 2½ hour test of the Ordovician from 8,764-8,812 ft. Full details of the test and formation tops have not been released.

A test of similar duration from 8,722-64 ft. recovered 450 ft. of heavily oil and gas-cut mud, and a test from 8,812-27 ft. made 330 ft. of slightly oil and gas-cut mud. The operator is continuing to test.

The potential discovery is 2 miles south of recent failures by this operator and by Empire State Oil Co. and about 2 miles north of The Texas Co.'s 1 NP "G" (NCT-7) which went to 10,805 ft. with some shows logged in Madison, but recovered only water on test of Ordovician.

Shell Locates Test On New Unit

Shell Oil Co. has made location for another important wildcat on the Cedar Creek anticline. The company will drill the initial test of the 21,400-acre Iron Bluff at 21-15 Unit, NE NW 15-13n-56e. The wildcat is to be a 10,000-ft. test to Ordovician and is about 8 miles northwest of production in Pine Unit where Shell now has six producing wells.

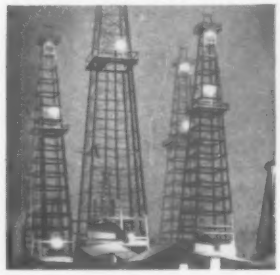
The new location is the twenty-fourth for this operator on the Cedar Creek structure. Of this number 12 have been successful, 4 have been suspended or abandoned and 8 are now drilling or testing.

Eastern Montana Discoveries Awaiting Test

Sun Oil Co. and Phillips Petroleum Co. are running casing with total depth at 12,640 ft. at 1 Dynneson, C SW NE 32-24n-58e in the Bronson area northwest of Sidney in Richland County. The well tested the interval 12,591 to 12,637 ft. for apparently commercial recoveries of oil from Ordovician. The well is regarded as potentially the most important Williston basin development since the discovery of oil in North Dakota due to its location in the eastern Montana central basin area.

South of this well the second important discovery of 1953 is drilling below 9,161 ft. The wildcat is Shell's 22-23 Unit, NW SE NW 33-10n-58e, in the Cabin Creek unit, Fallon

Map of the Williston basin showing existing pools and recent new discoveries. Arrow (1) denotes indicated Ordovician strike in the Gallup area of Harding County, South Dakota. Carter Oil Co.'s 1 Hendricks cored oil shows in the Ordovician at 8,373-83 ft. for the first significant shows of oil in South Dakota. Arrow (2) denotes indicated Ordovician discovery in the Bronson area of Richland County, Montana. Sun Oil Co. and Phillips Petroleum Co.'s 1 Dynneson, deepest well ever dug in Montana, is the first to show for production in the central part of the Williston basin between the Baker-Glendive anticline in Montana and the Nesson anticline in North Dakota.



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County. Commercial production has been indicated in a thick Mississippian section, and in Devonian. Reports that the operator had also recovered commercial quantities of oil from Ordovician have been neither confirmed or denied.

SOUTH DAKOTA

Gallup Area Wildcat Attempting Further Tests

Carter Oil Co. is attempting to run a second drill-stem test in Ordovician zones which produced interesting shows on previous test at 1 Hendricks, C SW NW 2-29n-3e. The operator has had difficulty in getting to bottom with tester, and anxiously awaited test results are delayed. The well made a pint of free oil, 10 ft. of heavily oil and gas-cut mud with 40 ft. of oil and gas-cut mud on test of the zone 8,364-73 ft. Cores below this depth to the total depth of 8,393 ft. recovered limestone with some stain and with fractures bleeding oil. Bottom of the core to 8,393 was wet.

COLORADO

Data Released at Colorado Permian Discovery In Weld

Sherrod & Apperson are installing pump at 8 Gillette, C NW NW 9-9n-61w, Lyons (Permian) sand discovery in Keota field of Weld County, with oil fill-up reported 2,000 ft. below the surface of the well. Casing was landed at 9,204 perforated from 8,476-96 ft. in Lyons sand. Top of Lyons was logged at 8,482 ft. Big Blue was topped at 8,840 ft. and Pennsylvanian at 9,254 ft. The well had shows in Big Blue which were not commercial. The wildcat, first in the basin to find commercial production below Cretaceous has already spurred the beginning of an exploratory campaign through the Denver-Julesburg basin. Continental deepened 1 Parry, C SW NW 13-9n-61w, a Cretaceous failure to test Lyons, and Eisenhower Drilling Co. has announced plans to continue 1 Niles, C SW SE 13-6n-61w in the Greasewood area to that formation.

The Denver-Julesburg basin in Colorado and in western Nebraska is undergoing the expected upturn in activity, both as a result of deeper opportunities demonstrated by the Permian discovery and because of increased interest in development and exploration of Cretaceous prospects. Completion of pipe-line connections from the basin to the Gurley, Nebraska station of the Platte Pipe Line is partially credited with the 27 new locations currently announced for the area. Fifteen of these were in Colorado. Nine of this number were wildcats. Of the 12 locations made in western Nebraska there were 4 wildcats, with increased emphasis on development drilling evident.

Moffat County, Colorado, Gas Discovery Completed

Mountain Fuel Supply Co. has completed 6 Allen, NE NW SE 33-12n-97w in the Powder Wash Unit, Moffat County for a new pay gas discovery tentatively credited to Lance. The well was completed for a gage of 8,770,000 cu. ft. of gas per day. Tops and producing interval were not released. Casing was landed at 8,250 ft. and total depth was 8,406 ft.

Gas production was established in Wasatch sands in this unit in 1931, and oil was discovered in Fort Union in 1949. Production of gas since discovery has been more than 26 billion cubic feet and nearly a million

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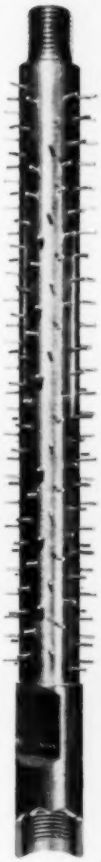

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barrels of oil have been produced from Fort Union. The apparent Lance gas discovery is the deepest test of the unit to date.

WYOMING

Seventh Pay Zone Found In Sussex Field

Continental Oil Co. swabbed oil at the rate of 115 bbl. in 13 hours from Amsden at 95 Unit, SW SW NE 23-42n-78w in Sussex field,

Map of northern Wyoming's Big Horn basin producing area. Arrow indicates Gulf Oil Corp.'s Manderson area discovery, apparently Wyoming's most significant find this year. The wildcat, 1 Thomas, is just southeast of the Manderson unit boundary, but apparently in trend with production inside the unit. The Gulf discovery flowed 820 bbl. of oil in 12 hours from the Phosphoria.

Johnson County for an apparent discovery in this formation which has not previously produced in the Sussex-Meadow Creek area. The discovery in this zone follows by a week the establishment of Sundance production at 93 Unit, SW SE NE 18-42n-78w. Both wells were part of a development program to Tensleep now being carried on by Continental.

The Amsden discovery, in contrast to the discovery in Sundance a week earlier was a commercial producer in the objective formation before test of Amsden. Production from the lower horizon was however, of higher gravity than that from Tensleep in the 8,690-8,788 ft. Casing was landed in the well at 8,900 ft. Total depth is 9,101 ft. Top of Amsden has not been released by the operator. Tests of Amsden are continuing.

OKLAHOMA

Production Tests Scheduled At Garfield County Wildcat

Production tests are scheduled for a new indicated discovery in northwestern Oklahoma's Garfield County at Toklan Production Co. 1 Blaser, SW SW NE 17-23n-4w.

The possible pool opener is located 2 miles south of Northeast Prairie Valley pool. A good drill-stem test in the Marshall sand at 6,066-6,104 ft. recovered 180 ft. of muddy oil with no water. The wildcat had Mississippian gas shows on test at 5,460-70 and 5,470-5,521 ft.

George W. Deck et al are completing 1 Welty, SW NE SW 5-23n-4, on the southwest side of Northeast Prairie Valley pool, flowing 120 bbl. of oil per day from the Marshall sand perforations at 6,136-44 ft. The well is also flowing an estimated 4,000 M.c.f. of gas per day from the upper Mississippi perforations at 5,492-5,510 ft.

Northeast Prairie Valley pool was opened in the second Wilcox and Mississippian at F. A. Gillespie & Sons and Fordee Rhoades Oil Co. 1 Cogswell heirs, SW SE NW 5-23n-4w. The pool has four producing zones: the Misener sand, Mississippi gas-distillate zone, second Wilcox, and the Marshall sand.

Missouri Has Condensate Shows at Elk City Test

Shell Oil Co. has registered more possible pay zone at 1 Carter & Caughron, wildcatt off the southwest flank of Beckham County's Elk City field in western Oklahoma.

A drill-stem test in the Missouri zone at 11,390-11,450 ft. flowed gas in 2 hours and 35 minutes. Recovery was 2,950 ft. of gas and condensate-cut water cushion and 180 ft. of gas and condensate-cut mud. Crews are drilling ahead at 11,479 ft. Projected depth of the wildcat is 15,500 ft. or the Des Moines. The Shell wildcat is located 1 mile from production.

Kendrick District Gets Further Activity Increase

Central Lincoln County's Kendrick district is currently the most active development spot in Oklahoma. Northwest Kendrick pool opened in January, is being extended in all directions, a north extension is proving successful, and a new pool ½ mile northeast of the area has been opened.

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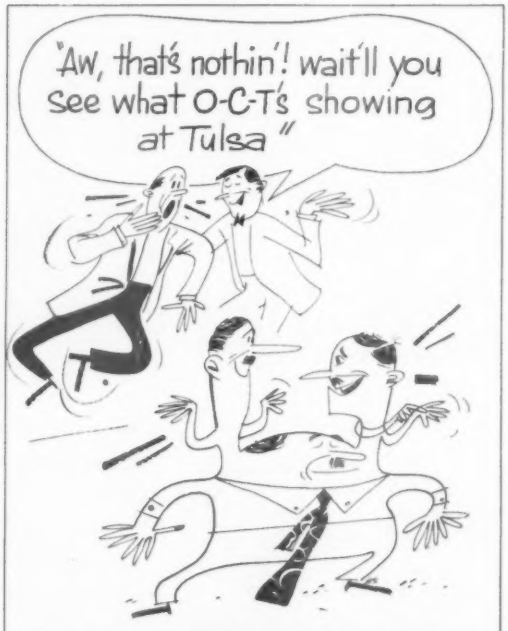

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SE SE SE 31-16n-5e, flowed oil at the rate of 4 bbl. per hour in the Prue sand for a north extension, while Magnolia Petroleum Co. et al 1 Sanders, NE NE SE 6, is below 2,860 ft. Three more oil wells have been completed in the pool by Floyd G. Hubbell. Barton & Rich, Ditsworth, Newlin & Martin have two new oil wells finaled in the area.

The new pool northeast of Kendrick district was opened by Foster Drilling Co. at 1 Josephine, SW SW SW 3-15n-5e, flowing 288 bbl. of oil per day from the Oswego at 3,282½-92 ft. The 2 Josephine is near completion, flowing 12 bbl. per hour, while the 3 Josephine is testing. The operators 4 Josephine in NE SW SW 3-15n-5e is getting under way. Mid-Continent Petroleum Corp. has an Oswego well near completion, and Sun Oil Co. is coring in the Oswego at another well in the area.

Production Tests Under Way At Kiowa County Prospect

Production tests are under way at Huffman & Malloy and Zephyr Drilling Corp's 1 Heiple, NW SE NW 6-7n-15w, discovery well of a new pool east of North Gotebo pool in Kiowa County, western Oklahoma.

The wildcat is located 5 miles west of Mountain View and east of North Gotebo pool. Unofficial reports state the well flowed 6 bbl. of oil per hour on one test, probably from the Springer. A drill-stem test in the Springer at 3,582-3,600 ft. flowed gas at the estimated rate of 1,000 M.c.f. per day.

Fast Development Due New McClain Pool

New deep North Freeny pool in McClain County, opened by Jay Simmons et al 1 Wilson, C SE SE 14-8n-4w, has a fast development program planned.

Kenneth A. Ellison and C. B. Wrightsman have a Tulip Creek test started at 1 Harrison, C SE SW 14-8n-4w, ½ mile west of the discovery well. Jay Simmons et al 1 Johnson in E½ W½ SW SW 13-8n-4w, is a new 11,000-ft. test offsetting the discovery well to the east. A south offset test is slated at Jay Simmons 1 Kidwell, C NE NE 2-8n-4w. The field's discovery well, Simmons 1 Wilson, C SE SE 14, has been flowing about 20 bbl. of oil per hour from the Tulip Creek perforations at 10,447-488 ft.

LOUISIANA

NORTH LOUISIANA

Outpost Drilling in Bossier Parish Willow Chute Area

Pan American Production Co. is drilling at 4,369 ft. at 1 Winkler, C NW SW 34-20n-13w, northeast outpost in Bossier Parish's Willow Chute area. The test is located 1¾ miles southeast of Benton in the central western part of the parish.

The well will seek production to about 9,500 ft. in the Cotton Valley and will test the Bodcaw at about 8,300 ft. The discovery well in the area produces from the Bodcaw. The I. L. V. Hunt in Section 5-19n-13w, Willow Chute discovery well, flowed at the estimated rate of 2,000 to 2,500 M.c.f. of gas per day from the Bodcaw sand of the Cotton Valley through perforations at 8,316-30 ft. The well also made about 15 to 20 bbl. of condensate per day.

Elsewhere in Bossier Parish, northwestern Louisiana, Sunray Oil Corp. was pulling core

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at 9,360-9,410 ft. in the Cotton Valley at 1 J. I. Roberts, C NE SE 33-22n-12w, wildcat 6 miles southeast of the town of Plain Dealing in northern Bossier. Some gas and condensate was logged in a core from 9,305-60 ft. Another drill-stem test at 9,239-69 ft. showed gas and a trace of condensate. Sunray will take the wildcat to 10,000 ft. to test most of the Cotton Valley at the test 4 miles west of South Sarepta field.

SOUTH LOUISIANA

Deep Test Staked at Iberia's Weeks Island

Shell Oil Co. has staked location for an 18,000-ft. test on the north flank of the Weeks Island dome in Iberia Parish at 2 Gonsoulin Minvielle-State Unit, 12,075 ft. north and 3,680 ft. east of USC&GS Station "Weeks 2" to location in Section 41-14s-7e. The new test is located about ½ mile northeast of 1 Weeks-Gall Unit, the world's deepest producing oil well.

New Offshore Discovery

The Breton Sound area of Plaquemines Parish has a new gas discovery at Kerr-McGee Oil Industries, Inc., 1-B State Lease 1230. The wildcat, located in Block 35 of State Lease 1230, perforated at 4,886-93 ft. for drill-stem test. Pipe filled with 3,000 ft. of cushion, using 17/64-in. choke, and well flowed gas at the rate of 3,360 M.c.f. daily. Testing is still under way.

At Southeast Pass in Plaquemines, Humble Oil & Refining Co. has tested gas and distillate from a new deep sand at 1 State Lease 2091-Southeast Pass. Total depth is 10,160 ft. The well flowed 60 bbl. of fluid and 418,000 cu. ft. of gas daily showing a gas-condensate ratio of 12,000:1 from perforations at 9,844-56 ft. The crude is 51° gravity. The section will be retested at 9,156-66 ft., which is another sand in the area not producing now.

The California Co. completed 1 Louisiana State 1924, opening a new oil field in the Southwest Pass area. The well flowed 240 bbl. of oil per day from perforations at 8,703-16 ft. A confirmation test to the new pool has been staked.

St. Charles Discovery Ready to Complete

A new wildcat oil discovery 6 miles northeast of Paradis field in St. Charles Parish is ready for completion at Pan American Gas Co. 1 Simoneaux. On initial 4-hour test the well flowed 305 bbl. of oil daily on 10/64-in. choke from reperforations at 10,325-10,338 ft. Operator is running wire line packers and is ready to complete.

Rapides Strike Swabs

Midstates Oil Corp. and J. R. Butler are swabbing at 1 Heflands, Inc., wildcat northwest of Rapides' Bliss field. Operator is swabbing with perforations at 8,592-94 ft. A drill-stem test from 8,594-97 ft. recovered 55 ft. of pipe line oil from the Wilcox.

At an outpost test in the Bliss area of Rapides, The California Co. has abandoned 1 Gunter, Section 9-1n-3w, with total depth 9,491 ft.

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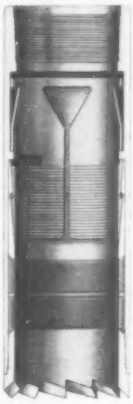

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MISSISSIPPI

Black Warrior Basin Highlights Activity

Union Producing Co. is completing the third gas well in Monroe County's Muldon field, northeastern Mississippi. The third well in the field is 1 Rye, Section 27-15s-6e, about ¾ mile southeast of the field's discovery well. The Sanders sand of the Chester was topped at 5,475 ft. and casing cemented at 5,474 ft. The well was cored out to 5,529 ft. finding 50 ft. of gas sands. Recovery on a drill-stem test run of open hole section included an unestimated amount of gas and 300 ft. of gas and condensate-cut mud.

Muldon field was the first field in this new producing area of northeastern Mississippi, and was opened in 1952 by Union Producing Co.

At the deep test in Clay County Carter Oil Co. recovered hard sandstone with asphaltic stain in cores from 9,341-9,412 ft. and are coring below 9,528 ft. at 1 McFadden et al, Section 36-16s-5e. Numerous shows have been found in tight sands at this wildcat, the deepest yet in the Black Warrior basin. The best drill-stem test was at 8,608-56 ft. when gas flowed with top pressure of 235 psi. in 1¼ hours.

Maxie Has Indications of Becoming Major Gas Reserve

Forrest County's Maxie field has indications of becoming a major gas reserve in Mississippi.

About 1½ miles southwest of the field's discovery well Ohio Oil Co. has cored 75 ft. of gas sand in the Eutaw-upper Tuscaloosa zone at 1-T Unit, 1,717 ft. from east line,

64 ft. from north line in Section 12-1s-13w.

Cores were cut from 7,314 to 7,442 ft. with gas sand being recovered at 7,320-24, 30-31, 40-56, 74-83, and 1,401-09 ft. Core analysis indicates a gas-water contact at 7,409 ft. Operator is drilling below 7,845 ft. and will core in the lower Tuscaloosa, which should be at about 8,200 ft. The lower Tuscaloosa sands are the pay sands in Maxie field. Two gas sands in the Wilcox formation with a total of 35 ft. of effective sands were also logged.

A new company, Union Petroleum Co., is planning to drill five new tests in Maxie field soon. Sheldon & Lee have one location staked at 1 U.S.A., SW SW 27-1n-12w, about 2 miles northeast of Maxie field production.

CANADA

Bonnie Glen-Pigeon Lake Extended Two Miles South

Highlighting western Canadian oil and gas operations during the past 7 days was a 2-mile extension to Bonnie Glen-Pigeon Lake D3 oil reef, a wet gas discovery in the Rimbey area that had penetrated over 100 ft. of wet gas zone, and a wet gas discovery in the Olds area of southern Alberta.

The new oil extension, about 1 mile east of the southeast tip of Pigeon Lake, adds considerably to the Bonnie Glen-Pigeon Lake oil reserve that lies in the reef trend southwest of Leduc-Woodbend oil field. This exploration success, owned by Stanolind Oil & Gas Co. and the California Standard Co. is located about midway between the 3¼ mile stretch between Bonnie Glen oil wells and the Stanolind 1 Cal Standard well to the south, which found only a thin noncommercial oil zone but was capped as a gas well.

The well is Stanolind-Cal Standard 2 Pigeon Lake, LSD 15, 24-26-28w4, 38 miles southwest of Edmonton. The venture indicated an approximate 300 ft. oil column, plus an additional 220 ft. of wet gas pay zone above, prior to entering formation water. Top of the oil pay came in at approximately 6,809 ft. Hole has completed drilling, will run log and production casing, preliminary to being placed on steady production.

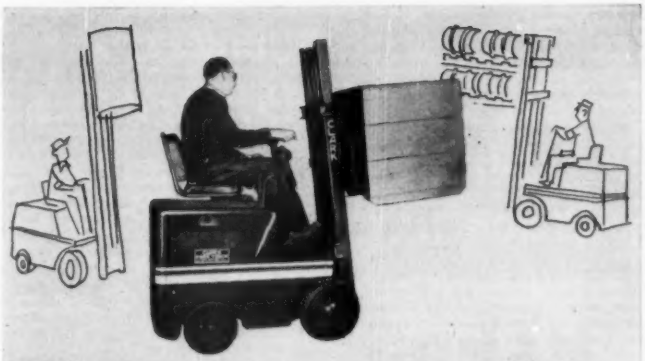
Rimbey strike... The wet gasser near Rimbey, 105 miles north of Calgary and 6 miles southwest of the California Standard 3-29 Homeglen oil discovery well, has so far penetrated over 100 ft. of natural gas and condensate-bearing D3 reef, and is heading down in search of an oil column. Bottom hole was approximately 8,000 ft. at week's end, and coring and testing was being continued.

The well is Calmont 1 Rimbey, on LSD 7, 25-42-2w5, 20 miles northwest of Lacombe town.

Olds area strike... The Olds area strike, also wet gas, came at a step-out driller of Shell Oil Co.'s 1¼ miles southwest of Shell's 1952 gas discovery well in that region. This venture, Shell 3 Olds, LSD 10, 10-32-1w5, in addition to finding natural gas, also gave up a substantial recovery of naphtha, or light-gravity crude oil, during drill-stem test in the upper section of the Devonian.

Drill-stem test from 8,481 to 8,538 ft. flowed natural gas at rate 3,500,000 cu. ft. daily, and gave a recovery of 1,260 ft. of gas and naphtha-cut sulfurous mud, with about 85 per cent being naphtha. Hole is now deepening for lower objectives.

Winchell Coulee area... After a lengthy testing period over an approximate 200-ft.



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AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

Madison section at the Winchell Coulee area wildcat in the southern Alberta foothills belt, Canadian Delhi Oil, Ltd., was unsuccessful in recovering water-free oil. Swabbing tests from perforations in the Madison gave up primarily formation water, with some signs of oil.

The well, on farmout lands from Britalta Petroleums, Ltd., has now been plugged back to the Gardium sandstone, and initial tests in that section flowed natural gas at rate of 2,00,000 cu. ft. per day and also gave up around 25 bbl. of distillate daily.

This well, Delhi-Britalta 1 Winchell Coulee, LSD 10, 24-29-6w5, is 35 miles northwest of Calgary and 25 miles due west of Didsbury. This well's first discovery was in the Cardium, where it gave up wet gas during drill-stem tests, over 13 months ago. The well was then deepened and natural gas was encountered in the Jumping Pound sand. The hole was then cased with a 5½-in. string, and was deepened into the Madison, with diameter of hole being only 4⅝-in.

The Madison was contacted at 10,692 ft., or 6,568 ft. below sea level, and approximately 200 ft. of zone was encountered to bottom 10,892 ft. Cores in the Madison showed varying amounts of porosity and oil-saturation, 3½-in. O.D. casing was run to bottom, and tests through perforations gave up primarily formation water, with some gas and only small amounts of oil. Considerable difficulty was encountered during testing operations through the small diameter hole, and officials believe that faulty cementing off of perforations may be partially responsible for the recovery of water in all sections of the Madison.

The Cardium production tests have been carried out in the perforated section 5,233-43 ft. Crew is now installing separator at well site, preliminary to continuing tests.

EASTERN CANADA

Gaspe . . . Five widely spaced tests are drilling on four different structures on the Gaspe peninsula of Quebec. Most westerly of these is 2 Bald Mountain on the anticline of that name, in which Gaspe Oil Ventures and Quebec Oil Development are both interested. A geological party of the Quebec Mines Department in 1952 determined the presence of true reefs in the limestone of Middle Silurian age, with a reef approximately 500 ft. thick in the Madeline River area a few miles northwest. The 2 Bald Mountain has installed a Bucyrus-Erie 48L spudder capable of drilling 9,000 ft. The test is now below 5,141 ft.

On the Galt Brook Dome, 33 miles farther east, Continental 1 Deep Test, owned exclusively by Gaspe Oil Ventures, had a fishing job at 2,421 ft., but has set and cemented whipstock at 2,015 ft. and is making new hole below 2,103 ft.

East and southeast some 37 miles, the 1 Tar Point, on the Tar Point anticline, in which Gaspe Oil Ventures and Quebec Oil are both interested encountered a show of high gravity paraffin base crude at 4,118 ft. believed to come from greater depths through cracks and fissures.

KENTUCKY

EASTERN KENTUCKY

In the Pike County sector of Big Sandy gas field, Kentucky West Virginia Gas Co. has completed a good gas well at their 996 B. F. Johnson on Long Fork. At a total depth of 1,632 ft. in Maxon (Mississippian) sand topped at 1,613 ft. well gaged 1,713,000 cu. ft. of gas daily with a rock pressure of 520 psi.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Atascosa County: J. W. Gorman 1 Gorman Fee, 1 Gambert Sur. 1104, A-287. Dry. TD 5,655 ft.

Thomas Bros. 1 O. F. Frederickson, Dr. Simmons S/D, 1, Tr. 588, Blk. 23. Dry. TD 1,875 ft.

Dimmit County: Howeth & Mason 1-A Dee Davenport, MEP&P Sur. 462, A-636. Dry. TD 4,205 ft.

Sun Oil Co. 1 David W. Bouldin et al, Blas Reyes Grant, A-4. Dry. TD 4,953 ft.

Duval County: Sid Katz E-1 W. R. Peters Est., GB&CNG Sur. 37. Dry. TD 4,380 ft.

Frio County: Curtis Bros. 1 W. D. Johnson, AB&M Sur. 1, A-27. Temporarily abandoned. TD 873 ft.

O. W. Killam 1 Hurgh Favor, John Gibson Sur. 3, A-352. Dry. TD 6,020 ft.

Hidalgo County: Union Producing Co. 1 Carl Gerber, Hill & Halbert S/D, J. J. Trevino Sur. A-221. IP 4,400 M.c.f. of gas per day, open flow, perfs. 8,248-68 ft. TD 8,505 ft.

Jim Hogg County: Humble Oil & Refining Co. D-2 E. B. Atwood, Las Cuevitas (Victoriana Gonzales) Gr. A-35. Dry. TD 5,005 ft.

* Nueces County: Appel Drilling Co. 1 C. A. Potts, Geo. H. Paul S/D D. IP 121 BOPD, ⅛, 41°, T/pay 5,815.5 ft. TD 5,827 ft.

* Phillips Petroleum Co. 1-A Fish "A," Corpus Christi Bay-St. Tr. 324. IPF 173.81 BOPD, ⅛, 39°, T/pay 7,657 ft. (sand 8.) TD 8,799 ft. (new pool, proposed name—Ransom Island.)

San Patricio County: H. J. Scibienski and S. A. Story, Jr. 1 Thomas Dix, Juan de la Garza Sur. A-7. Dry. TD 5,605 ft.

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WILDCAT COMPLETIONS

Webb County: O. W. Killam 3-224 Bruni Est., Sur. 2244. Dry. TD 3,963 ft.
O. W. Killam 77 Bruni Est., M. Arispe Gr. Dry. TD 3,302 ft.
O. W. Killam 78 Bruni Est., M. Arispe Gr. Dry. TD 2,360 ft.
O. W. Killam 79 Bruni Est., M. Arispe Gr. Dry. TD 4,353 ft.

TEXAS GULF COAST

Dewitt County: J. R. Butler 1 E. T. Clark et al, Jose Santos Sur. A-420. Dry. TD 5,006 ft.
Fayette County: Fort Bend Oil Co. 1 Bryant James, John M. Hensley & Peebles Sur. A-78. Dry. TD 5,160 ft.
* Sutton Drilling Co. 2-B E. A. Arnim, Wm. Kuykendall Sur. ½ A-219. IPP 60 BOPD 23°, perfs. open hole 2,233-36 ft. TD 2,236 ft.
Fort Bend County: L. H. Freedman et al 1 T. W. Davis Est. "A," J. J. Dickerson Sur. Dry. TD 3,247 ft.
Goliad County: F. Wm. Carr 1 Frank M. Atkinson, Daniel Gilmartin Sur. A-131. Dry. TD 8,750 ft.
Louis Haring, Hawn Bros. and Kirkwood & Morgan 1 Calhoun, M. J. Y'Barbo Sur. A-51. Dry. TD 4,268 ft.
* Harris County: The Federal Royalty Co. 1 W. L. Schwinle, Wm. White Sur. A-829. IPP 121 BOPD, 12/64, 39.2°, perfs. 5,538-41 ft. TD 6,015 ft. (Wildcat discovery oil well.)
Karnes County: Hankamer Investment Co. 1 Albert Bargmann, Casper Flores Sur. A-1. Dry. TD 7,020 ft.
W. Earl Rowe et al 1 E. S. Joslin, Carlos Martinez Sur. Dry. TD 6,210 ft.
Liberty County: Curtis Hankamer 1 Swilley Est., Hugh Means Sur. A-78. Dry. TD 8,604 ft.
Sun Oil Co. and Hurt Oil Co., Ltd., 1 Patton et al, Ames Green Sur. A-41. Dry. TD 8,502 ft.
Madison County: The Group Oil Co. 1 Mrs. Alice Bailey, Keton Jones Sur. A-128. Dry. TD 10,857 ft.
Refugio County: Pan American Producing Co. 8 J. F. Welder heirs, Manuel Blanco Sur. A-5. Dry. TD 6,405 ft.
Trinity County: R. W. Ramey 1 Raymond Ramey, G. W. Wilson Sur. A-628. Dry. TD 2,221 ft.
Washington County: Alaska Steamship Co., Newman Bros. Drilling Co. et al 1 W. F. Schottmann, Neston Clay Sur. A-29. Dry. TD 8,022 ft.

EAST TEXAS

Anderson County: Bill R. Tipton 1 Southern Pine Lumber Co., J. M. Brown Sur., A-932. Dry. TD 5,400 ft.
Cherokee County: Texas Eastern Production Co. 1-B Summers, J. M. Musquez Sur., A-37. Dry. TD 4,691 ft.
Hunt County: Thos. D. Humphrey & Sons 1 Boles Orphans Home, James Hamilton Sur., A-521. Dry. TD 4,355 ft.
Kaufman County: Carroll Deely 1 J. L. McDougal, E. Higdon Sur. Dry. TD 4,680 ft.
Wood County: William Tobian 1 F. R. Carmichael, G. W. Watson Sur., A-608. Dry. TD 7,018 ft.

WEST CENTRAL TEXAS

* Brown County: John Stoker 1 Hickman, F. M. Kinney Sur. IPP 20 BOPD, 42°, pay 1,302 ft. TD 1,307 ft.
* Worth Thomason 1 T. M. Marr, E. L. Betts Sur. 637. IPP 45 BOPD 42°, sand pay 1,046 ft. TD 1,059 ft.
Callahan County: W. M. Knight 1 Sewell Landers, Sec. 62, BBB&C. Dry. TD 3,125 ft.

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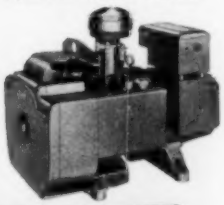

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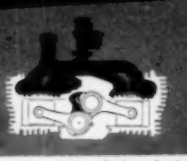

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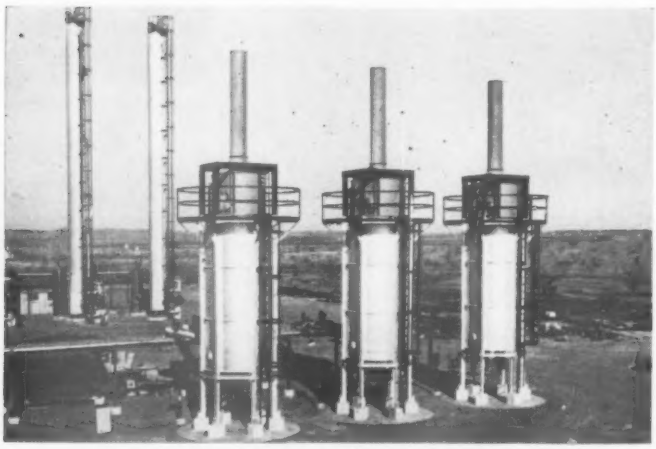

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WILDCAT COMPLETIONS

J. J. Lynn 1 Tom Windham, Sec. 159, GH&H, Dry, TD 3,432 ft., elev. 1,828 ft., Caddo 3,412 ft.

Coleman County: Paul E. Berry 1 S. A. Green, Sec. 739, A. Quigley Sur. Dry, TD 2,401 ft.

Wm. L. Curtis 1-C McDonald, 272-116-W. H. Bynum Sur. Dry. TD 1,907 ft.

Sid Katz 1 Brown Estate, Sec. 19, Josias B. Beal Sur. Dry. TD 3,427 ft.

Eastland County: Gulf Stream Oil Co. 1 L. A. Mayfield, 11-2-ETRR. Dry. TD 1,650 ft.

Haskell County: Blackwell Oil & Gas Co. 2-B Weinert, S. McFerron Sur. 133. Dry. TD 4,585 ft.

Bridwell Oil Co. 1-C Hendrick, J. Fenner Sur., A-582. Dry. TD 5,309 ft.

Jones County: B. Baldridge 1 S. E. Hodges, Sec. Y, A. Bell Sur. Dry. TD 1,860 ft.

Clark & Cowden Production Co. 1 F. H. Brockett, Blk. 271, G. W. Penny Sur. 271. Dry. TD 4,804 ft.

Great Lakes Carbon Corp. 2 W. T. Goree, Sec. 4, D&DA Sur. Dry. TD 2,233 ft.

Shackelford County: W. D. Newman 1 Gertrude Ledbetter, Seaborn and F. E. Brown Sur. Dry. TD 885 ft.

* Marshall R. Young 2 Dell Newell, Sec. 2, GH&H, IPP 12 BO in 2 hours and 20 minutes, pay 1,179 ft. TD 1,190 ft.

Stephens County: Terrell Petroleum Co. 1 Riddell heirs, 25-6-T&P. Dry. TD 4,402 ft., elev. 1,447 ft., Mississippian 4,342 ft.

* Texas Pacific Coal & Oil Co. 1-C Robertson, Sec. 1154, TE&L. IP 128 BOPD, 24/64-in., pay 4,169 ft. TD 4,435 ft.

Wittmer, Knight & Ewing 1-C Compton, 20-7-T&P. Dry. TD 4,220 ft.

Stonewall County: Atlantic Refining Co. 1 Young, Lot 26, Austin & Williams Sur., A-2. Dry. TD 6,250 ft., elev. 1,753 ft., Mississippian 5,958 ft., Ellenburger 6,095 ft.

Taylor County: J. J. Lynn 1 E. Hamilton, 34-16-T&P. Dry. TD 3,200 ft.

NORTH TEXAS

Archer County: Fortex Oil Co. 1-A Ferguson, SPRR Sur., A-416. Dry. TD 1,776 ft.

G & R Drilling Co. 1 Estill-Key, Blk. 2, W. E. Probert Sur. Dry. TD 1,471 ft.

J. Earle Gray 1 G. P. Meade, Blk. 35, L. M. Meade Pasture Sub d. Dry. TD 1,475 ft.

Helmerich & Payne, Inc. 1 Edgar Thomas, AB&M Sur. 1, A-7. Dry. TD 5,040 ft., elev. 1,179 ft., Strawn sand 4,160 ft., Mississippian 5,250 ft.

T. F. Hunter 1 S. W. Stone, Sec. 2, SPRR, A-1184. Dry. TD 4,288 ft.

G. E. Kadane & Sons 1 Wilson-Heirs-Ohio, M. Hutchinson Sur., A-172. Dry. TD 5,610 ft., Mississippian 5,450 ft., Ellenburger 5,489 ft.

Harry F. Snebold 1 Herman Mahler, Lucien Hobson Sur., A-166. Dry. TD 5,564 ft., Caddo 5,188 ft.

Baylor County: Concho Petroleum Co. 1 Claude Cowan, Sec. 90, T&NO. Dry. TD 5,178 ft.

Cooke County: Palmer Oil Corp. 1 Davie Burch, F. Cook Sur., A-242. Dry. TD 4,485 ft.

Sinclair Oil & Gas Co. 1 Millie L. Murrell, Robert Finney Sur., A-389. Dry. TD 6,215 ft.

Snuggs & Swick 1 Epting, J. R. Clark Sur., A-226. Dry. TD 4,907 ft.

Denton County: McMurrey Corp. 1 J. A. Dane, I. Walter Sur., A-1329. Dry. TD 2,500 ft.

Foard County: British American Oil Producing Co. 1 A. A. Swank, 21-A-T&NO. Dry. TD 7,616 ft., elev. 1,350 ft., Caddo 6,260 ft., Ellenburger 7,509 ft.

WILDCAT COMPLETIONS

* Jack County: Lone Star Producing Co. 1 Ornee Stewart, S. S. Gregg Sur., A-2115. IP 4,916 M.f.g., 10 bbl. distillate, conglomerate pay 5,064 ft. TD 5,636 ft.
Frank Wood Associates, Inc. 1 H. E. Vowles E. Smith Sur., A-524. Dry. TD 3,925 ft.

Montague County: Arnold H. Bruner 1 A. J. Fenoglio, H. Williams Sur., A-847. Dry. TD 6,689 ft.

* Wilbarger County: Pounds-Rogers 1 Pounds-Rogers-Williams, 100-14-H&TC. IPP 6 BOPD, pay 187 ft., TD 217 ft.
Rycade Oil Corp. 1 W. A. Bond, 78-16-H&TC. Dry. TD 5,200 ft.

* Young County: R. H. Busby 1 Fred Fitzgerald, E. G. Rector Sur., A-235. IPP 14.6 BOPD, pay 3,724 ft. TD 3,755 ft.
R. H. Busby 1-B Holcomb, I. L. Hill Sur., A-126. Dry. TD 3,892 ft.
Champlin Refining Co. 1-A McKinley, M. Gholson Sur., A-1983. Dry. TD 4,496 ft.

WEST TEXAS

Andrews County: Fuhrman Petroleum Co. 1-E W. T. Ford, 16-A43-PSL, Fuhrman-Mascho field. Dry at TD 12,380 ft., PB and completed as successful pool well. Elev. 3,187 ft., Fusselman 11,284 ft., Simpson 11,804 ft., Ellenburger 12,338 ft.

* Coke County: Humble Oil & Refining Co. 1 Mrs. Helen Harris Weaver, Sec. 7, EL&RR Sur. IPP 104 BOPD, 42°, pay 5,336-52 ft. TD 6,989 ft.

Concho County: B. L. Wooley 1 O. L. Sims, Sec. 60, Christian Kirchner Sur. Dry. TD 4,283 ft., elev. 1,672 ft., Ellenburger 4,093 ft.

Crane County: Shell Oil Co. 1 E. Sapp, H. T. Sapp Sur. 6. Dry. TD 7,020 ft., elev. 2,476 ft., Ellenburger 6,870 ft.

Dawson County: Texas Crude Co. 1-109 Lindsey, 109-M-EL&RR. Dry. TD 8,601 ft., Wolfcamp reef 8,583 ft.

* Ector County: Cities Production Corp. 1-E Cross, 44-43-T2S-T&P. IP 321 BOPD, 26/64-in., 34°, pay 4,264 ft., TD 4,340 ft.

Howard County: Stanolind Oil & Gas Co. 1 L. M. Anderson, 3-31-T2N-T&P. Dry. TD 7,739 ft., elev. 2,623 ft., reef 7,706 ft.

Irion County: Austral Oil Exploration Co. 1 Sol Mayer, Washington County RR Sur. 49. Dry. TD 2,540 ft.

Loving County: Quinn & Adams 1 Mrs. Minnie Kyle, 22-55-T1-T&P. Dry. TD 3,990 ft.

* Pecos County: C. H. Priddy et al 1 Leon Land & Cattle Co., 3-203-T. Walters Sur. IPP 10 BOPD, 33°, pay 2,856-76 ft. TD 2,999 ft.

Reeves County: L. C. Wahlenmaier 1 S. A. Fishburn, 12-C18-PSL. Dry. TD 4,095 ft.

* Runnels County: Mar-Tex Realization Corp. 1 Homer C. Daniel, J. A. Yeary Sur. 273. IP 221 BOPD, 20/64-in., 42°, pay 4,276 ft. TD 4,323 ft.
Bert Fields 1 T. S. Reed, Austin & Williams Sur. 262. Dry. TD 4,150 ft., elev. 1,775 ft., Caddo 4,018 ft.
Gulf Oil Corp. 1 W. A. Mitchell, L. Forsythe Sur. 450, A-176. Dry. TD 4,517 ft.
R & R Drilling Co. 1 J. M. Treadway, 30-593-Jas. K. Miller Sur. Dry. TD 5,305 ft., elev. 1,799 ft., Ellenburger 5,115 ft.

* Schleicher County: Robert W. Berry 1 A. B. Thomerson, 65-H-GH&SA. IP 135 BOPD, 3/16-in., 39°, Strawn 5,288-97 ft. TD 5,754 ft.
C. L. Norsworthy Jr. 1 S. E. Jones, 36-K-GH&SA. Dry. TD 6,010 ft., elev. 2,327 ft., Ellenburger 5,600 ft.

Sutton County: C. L. Norsworthy Jr. 1 J. G. Fields, 11-B-HE&WT. Dry. TD 6,188 ft., elev. 2,323 ft., Strawn 5,770 ft.

Tom Green County: M. H. Green and Howard W. McKinney 1 Llano CSL Sur., 16-964-Llano CSL. Dry. TD 6,293 ft. in dolomite.

Upton County: Cities Production Corp. 1 AR University, 3-58-University. Dry. TD 12,404 ft., elev. 2,626 ft., Devonian 10,894 ft., Fusselman 11,395 ft., Ellenburger 12,205 ft.
Oliver & Kotyza 1-A Carney, 2-1-MK&T. Dry. TD 2,036 ft.

SOUTHEAST NEW MEXICO

* Lea County: Continental Oil Co. 1 Anderson Ranch Unit, 11-16s-32e. IP 1,968 BOPD, 30/64-in., 54°, Devonian 13,374 ft., elev. 4,315 ft. TD 13,775 ft. Discovery.
Rowan Drilling Co. 1 Simmons-Federal, 8-10s-38e. Dry. TD 12,165 ft., elev. 3,931 ft., Wolfcamp 9,040 ft., Mississippian chat 11,616 ft., Devonian 12,080 ft.
Union Oil Co. 1 Harvey A. Heller, 24-16s-37e. Dry. TD 10,085 ft., elev. 3,700 ft., Abo 8,480 ft.

Torrance County: Rogers & Hinds 1 Hinji, 31-3u-15e. Dry. TD 1,201 ft. in granite wash.

ILLINOIS

St. Clair County: T. C. Teeter 1 Harms, SE SW NW 31-2n-6w. Dry. TD 2,562 ft.

INDIANA

Daviess County: Harry Miller 1 Hyatt, SW SW NW 18-3n-7w. Dry. TD 1,202 ft.

Dubois County: Calvert Drilling Co. 1 Bartlett, NE SE NE 16-3s-5w. Dry. TD 1,096 ft.
Mulzer Bros. 1 Joelkel, NW NW NE 7-3s-5w. Dry. TD 1,066 ft.

Gibson County: Calvert Drilling Co. 1 Stunkel heirs, NW NW SE 11-3s-13w. Dry. TD 2,822 ft.

Owen County: J. F. Simpson 1 Shishcoff, SE NE SE 10-9n-5w. Dry. TD 1,469 ft.

Posey County: Felmont Oil 1 Hodge, SW SE NE 9-7s--14w. Dry. TD 2,917 ft.

Sullivan County: T&H Corp. 1 Lowder Milk Co., NE NW SW 25-8n-11w. Dry. TD 1,747 ft.

Vigo County: K. Kuhn 1 Monan Coal Co.-M. Johnson, NW NW SW 31-10n-8w. dry. TD 500 ft.

KENTUCKY

Christian County: W. S. Johnston 1 Ragsdale, 1-B-26. Dry. TD 1,300 ft.

Henderson County: Barron Kidd 1 Smith, NE SE NW 22--P-24. Dry. TD 2,546 ft.
G. A. Hoffman 1 Overfield, SW NW NE 11-O-22. Dry. TD 2,748 ft.

Todd County: Haley-Ware-Read 1 Hollingsworth, NE SE SW 7-C-29. Dry. TD 1,550 ft.

MICHIGAN

Clare County: Louis Rose 1 O'Brien et al, NW SW SE 5-20n-5w. Dry. TD 5,170 ft. in Richfield.

Mason County: Carter Oil Co. 1 Timpy, NW NW SW 20-19n-17w. Dry. TD 4,840 ft. in Niagaran.

Midland County: Sun Oil Co. 1 Wolverine Power et al, NW NW NW 23-16n-1w. Dry. TD 5,360 ft. in Sylvania.

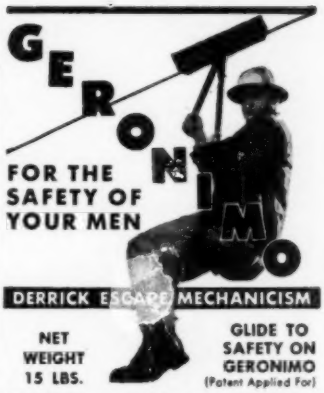
Muskegon County: Taggart Bros. Gas Co. 2 Ramthun, NE NW 7-12n-17w. Dry. TD 4,014 ft. in Niagaran.

Osceola County: McClure Oil Co. 1 Johnson, SE NW SE 16-19n-10w. Dry. TD 3,813 ft. in Monroe "Reed City" zone.

MISSISSIPPI

Adams County: John S. Callon 2 R. L. Emery, Jr., 60-6n-1w. Dry. TD 6,508 ft. Baker shale 6,338 ft.

Jefferson County: Petersen Drilling Co. et al 1 Board of Supervisors-City Bank &



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SEE THE NEW U-40 UNIT RIG
DESIGNED FOR THE JOB....

SEE YOU IN TULSA MAY 14-23..... INTERNATIONAL PETROLEUM EXPOSITION

WILDCAT COMPLETIONS

Trust Co., 47-8n-1e. Dry. TD 6,515 ft. Base Baker shale 5,631 ft.

Wayne County: Walter E. Sistrunk 1 W. S. Bullard, C SE NW 22-9n-6w. Dry. TD 5,210 ft. Xmas 5,150 ft.

Yazoo County: Marvin H. McMurrey 1 Mrs. M. C. Hays, 15-12n-3w. Dry. TD 7,215 ft. Lower Cretaceous 7,172 ft.

SOUTH LOUISIANA

Ascension Parish: Placid Oil Co. and Southdown Sugars, Inc. 1 Waguespack Bros., Inc., 9-10s-3e. Dry. TD 11,361 ft.

Avoyelles Parish: W. A. Moncrief 1 Turner, 6-1s-4e. Dry. TD 10,200 ft. Wilcox sand 7,512 ft.

Iberia Parish: Gulf Refining Co. 1 Florence Spiller, 32-12s-11e. Dry. TD 11,512 ft.

* Plaquemines Parish: The California Co. 1 Louisiana State 1924, Southwest Pass area. IPF 240 BOPD, 32.1°, 8,703-16 ft. TD 8,913 ft. (oil discovery.)

Gulf Refining Co. 2 St. Lse. 1913, 22s-20e, Blind Bay area. Dry. TD 10,000 ft.

* St. Landry Parish: Atlantic Refining Co. 1 Donald S. Gardner, 5-7s-3e. IPF 51.5 BOPD, 50°, 9,300-09 ft. TD 10,992 ft. (Gas-distillate discovery.)

Circle Drilling Co. 1 Ariel Savoie, 46-6s-1e. Dry. TD 10,466 ft.

* St. Mary Parish: The Texas Co. 1 St. Mary Parish School Board, 16-17s-12e. IP 138 BOPD, 8/64, 27°, 11,687-696 ft. TD 13,694 ft.

NORTH LOUISIANA

Natchitoches Parish: Carter Oil Co. 19 Louisiana Long Leaf Lumber Co. core test, 860 ft. N and 660 ft. E of SWc NE SW 4-7n-9w. Dry. TD 2,600 ft.

ARKANSAS

Ouachita County: L. M. Bibby et al 1 Goodwin, C SW SW SE 12-15s-16w. Dry. TD 3,210 ft.

Prairie County: Carter Oil Co. 13 core test, 63 ft. S and 42 ft. E NWc SW 19-2n-4w. Dry. TD 2,780 ft.

OKLAHOMA

Atoka County: J. J. Madden 1 Winters, SW SW NW NW 9-1s--14e. Dry. TD 1,000 ft.

Cotton County: R. Benton Ross et al 1 Kinnaird, SW SW SW NW 26-5s-12w. Dry. TD 1,860 ft.

Garvin County: Wayne Misner Drilling Co. 1 Price, S½ SW SW 22-4n-2e. Dry. TD 2,832 ft.

Jefferson County: Perry Browning et al 1 Miller, N½ SW NW SW 29-4s-8w. Dry. TD 1,881 ft.

Kay County: Smitherman & Cohen Drilling Co. 1 Cooper, SE SW SW 27-28n-5e. Dry. TD 3,025 ft.

Kingfisher County: Champlin Refining Co. 1 Wiley, C NW NE 10-18n-8w. Dry. TD 8,556 ft. Sylvan 8,497 ft.

* Lincoln County: Foster Drilling Co. 1 Josephine, SW SW SW 3-15n-5e. IPF 288 BOPD, Oswego lime 3,282-92 ft. TD 3,404 ft. (new pool.)

Jones-Shelburne 1 Holland Est., NW NW SW 9-14n-3e. Dry. TD 5,246 ft.

Logan County: Altus Drilling Co. 1 Lowell, SE SE NW 3-18n-4w. Dry. TD 5,025 ft.

McClain County: Ashland Oil & Refining Co. 1 Mose Louthan unit, SE NW 19-5n-3w. Dry. TD 8,723 ft.

* Oklahoma County: Glenn McCarthy 2 Rogers, NE SW NE 18-14n-1e. IPF 156 BOPD, 43°, Cleveland 4,349-70 ft. TD 4,430 ft. (New pool.)

Payne County: Wilcox Oil Co. 1 Davis, SW SW NE 2-18n-3e. Dry. TD 4,076 ft.

KANSAS

* Barber County: Champlin Refining Co. 1 Winter, SW SE SE 12-31s-13w. IP 1,100 M.c.f. of gas per day, Douglas 3,544-53 ft. TD 3,620 ft. (Opens Nurse pool.)

Kingman County: Magnolia Petroleum Co. 1 Moorehouse, NE NE SE 6-29s-5w. Dry. TD 4,432 ft.

Lyon County: Shell Oil Co. 1 Johnson, SE NE NE 15-20s-11e. Dry. TD 2,618 ft.

Marion County: A. J. Stormfelz 1 Allen, SW SW SE 29-20s-4e. Dry. TD 2,739 ft.

Pawnee County: Petroleum, Inc. 1 Fertig, NE SW NE 16-22s-15w. Dry. TD 4,051 ft.

M. B. Armer 1 Smith, NW NE NE 21-22s-20w. Dry. TD 4,756 ft.

Reno County: Penguin 1 Phillips, NE SW NW 23-22s-6w. Dry. TD 4,022 ft.

Riley County: Salina Drilling Co. 1 Llewellen, NE NE NE 11-9s-4e. Dry. TD 2,816 ft.

Federal Royalty 1 Gordon, NE NE NW 13-9s-4e. Dry. TD 2,684 ft.

Rooks County: J. H. Burkhardt 1 Maddy, SW SW SE 12-8s-18w. Dry. TD 3,430 ft.

Walters 1 Hennasey, NE NE NE 26-9s-18w. Dry. TD 3,728 ft.

Aikens & Owens 1 Winters, SW SW NE 22-10s-19w. Dry. TD 3,686 ft.

Saline County: C. McCowan 1 McLin, NE NE SW 32-15s-1w. Dry. TD 2,720 ft.

Stafford County: Anschutz 1 Falen, CSL SE NW 34-24s-11w. Dry. TD 3,956 ft.

Woodson County: Artnell 1 Pendley, NE NE SW 5-26s-15e. Dry. TD 1,535 ft.

SOUTH DAKOTA

Custer County: Emil B. Kucera 2 Barker, NW NE NW 34-6s-2e. Temp. susp. Fish in hole. TD 1,580 ft. Madison 1,446 ft.

CALIFORNIA

Fresno County: C. S. Cressaty 1 Cressaty, 2-21s-14e. Dry. TD 618 ft. (Cretaceous 220 ft.)

Kern County: Gilliland Oil Co. & C. O. Davis 10-2 S. F. & F. L. Co., 10-25s-18e. Dry. TD 2,290 ft. (Escudo 1,512 ft., Carneros 1,763 ft., Point of Rocks 1,885 ft.)

Franco Western Oil Corp. 21, 24-29s-29e. Dry. TD 3,432 ft.

Twentieth Century Oil Co. 1 M & T, 3-29s-29e. Dry. TD 3,100 ft.

Bryan Smith 1 Laughlin, 30-30s-30e. Dry. TD 790 ft. (Granite 758 ft.)

Standard Oil Co. 24 "Well," 35-29s-29e. Dry. TD 5,400 ft.

Atlas Oil Co. 81 Williams Comm., 25-29s-26e. Dry. TD 4,695 ft.

N. P. Van Valkenburgh 1 Van, 13-29s-20e. Dry. TD 6,326 ft.

Bankline Oil Co. 48-24 Metson, 24-11n-23w. Dry. TD 2,494 ft.

Sunset Oil Co. 78 Sunset-Tejon, 3-11n-18w. Dry. TD 1,255 ft.

Los Angeles County: Sunray Oil Corp. 34-20 W. P. Smith, 20-2n-16w. Dry. TD 4,375 ft.

Filmland Oil Co., Ltd. 1 Martino, 5-4n-17w. Dry. TD 8,230 ft.

* The Texas Co. 1 Del Amo (NCT-1), NE SW 24s-13w. IP 243 BOPD, 16/64-in., 30.4°, perforations at 8,611-8,646 ft. TD 8,724 ft. (New pool discovery ½ mile SE of Dominguez field.)

Orange County: Bandini Pet. Co. 31-68 Bradley, 31-5s-10w. Dry. TD 6,220 ft.

Sacramento County: Artnell Company 1 Hansen, 18-6n-5e. Dry. TD 4,501 ft.

* Santa Barbara County: Union Oil Co. 46-3 Jesus Maria, 3-8n-35w. IP 66 BO 9 hours, 15.2°, 11 per cent cut, perforations at 3,236-3,665 ft. TD 3,760 ft. (Extension to Jesus Maria field.)

MONTANA

Liberty County: Annaconda Copper Mining 1 Adams, C NE SW 26-37n-5e. Dry. TD 3,410 ft. Madison 3,100 ft.

WYOMING

Fremont County: John F. Camp 2 Government, SW NW NW 35-33n-93w. Dry. TD 4,951 ft. Tensleep 4,893 ft.

* Johnson County: Continental Oil Co. 93 Unit, SW SE NE 18-42n-78w. 192 BOPD swab potential, Sundance 7,911 ft. TD 9,280 ft. PBTD 8,000 ft. (new pay discovery.)

* Park County: North Shoshone Syndicate 1, SW SE NE 1-53n-102w. 5 to 6 BOPD, swab through casing. Oil sand 2,403 ft. TD 2,448 ft. (Frontier discovery.)

COLORADO

Boulder County: Bill Tomberlin 1 Marlatt, SE SE NW 36-3n-70w. Dry. TD 2,803 ft. Hygiene 2,715 ft.

* Logan County: Don Johnston Drilling Co.-E. M. Craig, Jr. 1 Budin, SW SW NE 6-8n-54w. IP 8,000 M.c.f. of gas in 30 minutes. "J" sand 5,329 ft. ("J" sand discovery, new field.) TD 5,368 ft.

* Moffat County: Mountain Fuel Supply Co. 6 Carl Allen, NE NW SE 33--12n-97w. IP 8,770 M.c.f. of gas per day, Lance. TD 8,406 ft. PBTD 8,206 ft. (New pay discovery.)

* Morgan County: Roden, Darden & McRae and Tri-Mark Oil 1 Olsen, IPF 608 BOPD, ½-in. "J" sand 4,904 ft. TD 4,916 ft. ("J" sand discovery, new field.)

Washington County: Woodward Oil Co., Inc., and Ziegler Exploration 1 Kejr, SE SE SE 17-2s-55w. Dry. TD 5,263 ft.

Weld County: C. G. Classcock, Jr. 1 Lindahl, SW SE NW 27-9n-58w. Dry. TD 6,470 ft. Skull Creek 6,462 ft.

MANITOBA

Royalite-Triad et al 1 Max Lake, LSD 4, 36-1-21w1. Dry. TD 3,688 ft.

SASKATCHEWAN

Shell 1 Estevan, LSD 6, 24-8-9w2. Dry. TD 4,450 ft.

Tide Water 1 Leon Lake Crown, LSD 5, 28-8-19w3. Dry. TD 4,779 ft.

Socony-J. P. Owens 1 West Peepeekeesis, LSD 13, 11-22-11w2. Dry. TD 4,193 ft.

ALBERTA

* Delhi-Britalta 1 Winchell Coulee, LSD 10, 24-29-6w5. Distillate-bearing gas well, Cardium sandstone, perfs. 5,233-43 ft. TD 10,892 ft.

Imperial 6-29 Adrian Lake, LSD 6, 29-47-21w4. Dry. TD 5,444 ft.

Texaco A-1 Grassy Lake, LSD 12, 10-10-13w4. Dry. TD 3,125 ft.

Imperial 6-7 Red Rose, LSD 6, 7-30-14w4. Dry. TD 4,580 ft.

Cal-Standard 13-20 Smoky River, LSD 13, 20-75-2w6. Dry. TD 9,612 ft.

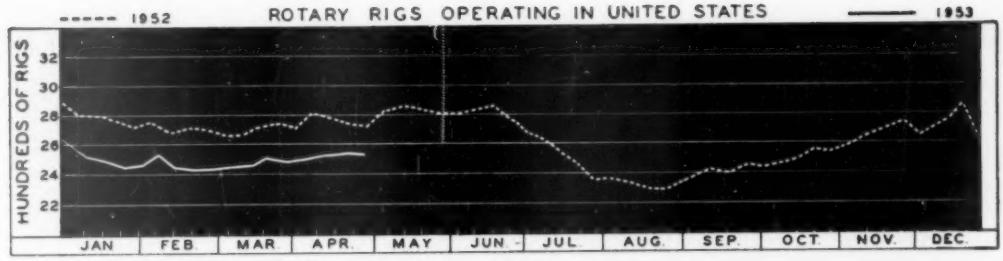
Cal-Standard 2-22 Steen River, LSD 2, 22-117-5w6. Dry. TD 5,767 ft.

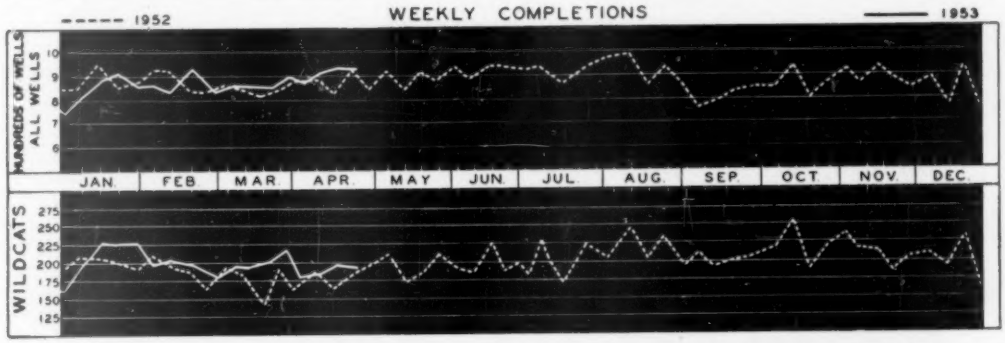
NORTHWEST TERRITORIES

NWT 2 Big Island, unsurveyed territory. Dry. TD 1,426 ft.

LEGAL

828.82 acres of Tribal and 2,786.60 acres of Allotted Indian Lands located in Twp. 11 N., R. 21; Twp. 12 N., Rges. 20 & 21; Twp. 13 N., Rges. 20 & 21 E., BHM, in the Cheyenne River Reservation, South Dakota, are being advertised for oil and gas leasing, bids on which will be opened May 26, 1953, at 2:00 PM, C.S.T., at the office of the Superintendent of the Cheyenne River Indian Agency, Cheyenne Agency, South Dakota. Full descriptions and copies of the advertisement may be obtained from the Superintendent, Cheyenne River Indian Agency, Cheyenne Agency, South Dakota, or from the Oil and Gas Supervisor, U. S. Geological Survey, Federal Building, Casper, Wyoming.





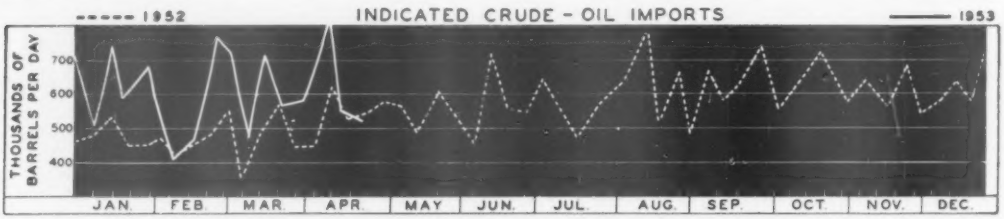
CURRENT STATISTICS

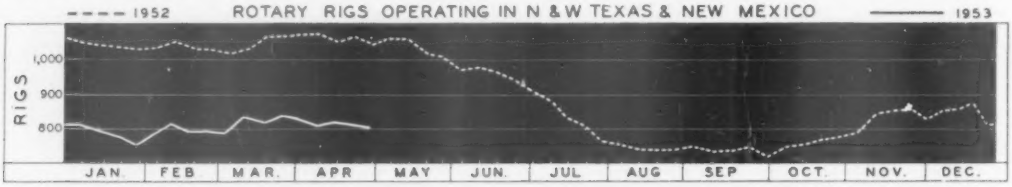
EXPLORATION

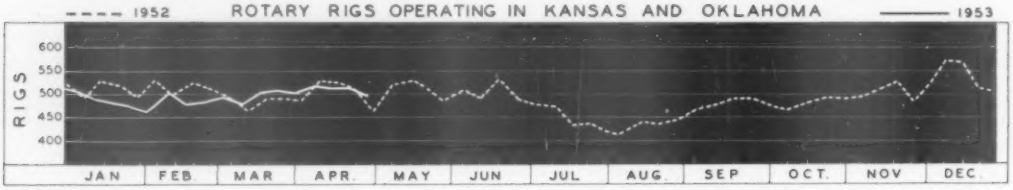
WEEKLY WELL COMPLETIONS . . . WEEK ENDED APRIL 25, 1953

	Total of all wells					Apr. 25		Wildcat completions and discoveries					Cumulative total, 1953				
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	13	7	0	*6	19,150	212	224	0	0	0	0	0	0	0	0	0	0
Pennsylvania	32	15	3	†14	57,647	525	530	0	0	0	0	0	0	0	3	6	9
West Virginia	9	1	5	3	19,300	181	197	0	0	0	0	0	0	0	2	2	4
Ohio	26	10	3	‡13	53,512	310	293	0	0	0	0	0	1	0	0	8	9
Indiana	20	7	0	13	38,062	372	340	0	0	0	8	8	6	0	1	85	92
Kentucky	24	8	8	8	47,017	322	392	0	0	0	4	4	4	0	0	60	64
Illinois	29	13	0	16	78,658	522	473	0	0	0	1	1	1	0	0	98	99
Michigan	9	4	0	5	41,874	168	202	0	0	0	5	5	7	0	2	65	74
Kansas	98	40	10	§48	322,024	1,478	1,513	0	0	1	14	15	32	0	12	233	277
Nebraska	4	4	0	0	22,446	86	74	0	0	0	0	0	7	0	0	40	47
Oklahoma	128	79	2	¶47	504,491	2,150	1,904	2	0	0	10	12	31	4	7	194	236
Texas	344	194	22	128	1,576,105	5,259	5,827	15	0	2	82	99	275	22	61	1,296	1,654
North Central (Dist. 7-B & 9)	139	87	2	50	473,264	1,899	1,821	6	0	1	34	41	143	0	8	541	692
West (Dist. 7-C & 8)	80	56	1	23	433,106	1,148	1,805	5	0	0	15	20	52	2	4	198	256
Panhandle (Dist. 10)	18	6	11	1	53,902	274	218	0	0	0	0	0	0	2	0	7	9
Eastern (Dist. 5 & 6)	10	0	1	9	58,284	242	284	0	0	0	5	5	8	1	1	82	92
Gulf Coast (Dist. 2 & 3)	54	23	5	26	340,365	801	869	2	0	0	14	16	39	5	27	202	273
Southwest (Dist. 1 & 4)	43	22	2	19	217,184	895	830	2	0	1	14	17	33	12	21	266	332
Louisiana	71	29	3	39	496,579	784	717	1	2	0	6	9	19	4	7	103	133
Northern	13	7	0	6	40,083	313	382	0	0	0	1	1	1	0	0	37	38
Southern	58	22	3	33	456,496	471	335	1	2	0	5	8	18	4	7	66	95
Arkansas	10	7	0	3	37,672	144	123	0	0	0	2	2	5	0	0	32	37
Mississippi	5	1	0	4	31,461	107	133	0	0	0	4	4	6	0	2	53	61
Southeastern States	1	0	0	1	6,800	44	16	0	0	0	0	0	1	0	0	31	32
Montana	6	5	0	1	20,264	114	49	0	0	0	1	1	1	0	0	31	32
Wyoming	15	12	1	2	70,373	185	186	2	0	0	1	3	4	0	0	31	35
Colorado	10	5	2	3	54,140	154	127	1	0	2	3	6	5	0	4	80	89
Utah	0	0	0	0	0	24	26	0	0	0	0	0	1	0	0	14	15
New Mexico	22	16	2	4	167,564	400	298	1	0	0	3	4	7	0	4	44	55
California	59	41	1	17	221,638	770	822	2	0	0	14	16	21	0	2	177	200
North Dakota	1	1	0	0	8,450	70	7	0	0	0	0	0	0	0	0	13	13
Miscellaneous (S. D.)	1	0	0	1	1,580	13	24	0	0	0	1	1	0	0	0	11	11
Total United States	937	499	62	376	3,896,807	14,394	14,497	24	2	5	159	190	434	30	107	2,707	3,278
Total previous week	938	485	78	375	3,603,735			22	3	3	171	199	410	28	102	2,548	3,088
Total April 26, 1952	844	428	56	360	3,491,060			17	2	7	173	199	453	35	81	2,527	3,096

Service wells included: *6, †12, ‡3, §4, ¶5.



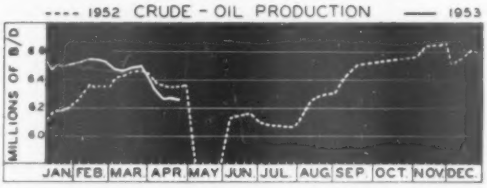


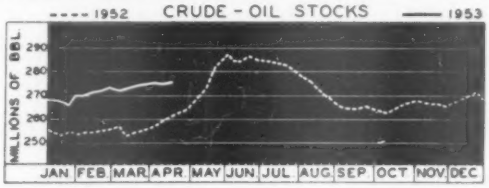


DAILY AVERAGE PRODUCTION FOR WEEK

	April 25			Apr. 18
	Crude oil	Lease condensate	Total	total
Alabama	4,800		4,800	4,200
Arkansas	76,650	650	77,300	78,600
California	998,900		998,900	999,100
Colorado	93,100		93,100	93,200
Eastern	57,300		57,300	57,200
Florida	1,450		1,450	1,450
Illinois	162,800		162,800	163,300
Indiana	34,900		34,900	35,100
Kansas	324,300		324,300	334,800
Kentucky	29,900		29,900	29,700
Louisiana	648,975	41,300	690,275	692,325
North	111,550	2,300	113,850	115,900
South	537,425	39,000	576,425	576,425
Michigan	34,600		34,600	34,400
Mississippi	91,400	4,700	96,100	97,050
Montana	31,000		31,000	30,800
Nebraska	13,100		13,100	13,000
New Mexico	184,825	650	185,475	185,475
Oklahoma	548,100		548,100	546,700
Texas	2,607,975	46,700	2,654,675	2,654,675
Dist. 1	34,275	250	34,525	34,525
Dist. 2	145,300	5,900	151,200	151,200
Dist. 3	436,300	24,000	460,300	460,300
Dist. 4	243,500	5,800	249,300	249,300
Dist. 5	46,500	450	46,950	46,950
Dist. 6	118,725	5,700	124,425	124,425
East Texas field	254,000		254,000	254,000
Dist. 7-B	102,950	75	103,025	103,025
Dist. 7-C	133,500	3,500	137,000	137,000
Dist. 8	857,550	300	857,850	857,850
Dist. 9	163,275	700	163,975	163,975
Dist. 10	72,100	25	72,125	72,125
Utah	5,200		5,200	4,700
Wyoming	208,200		208,200	206,800
North Dakota	14,300		14,300	14,200
Total U. S.	6,171,775	94,000	6,265,775	6,276,775
Change from previous week, down			11,000	
Canada	199,300		199,300	196,150
Total U. S. production January 1-April 25			742,111,550 bbl.	
Same period last year (crude plus cond.)			*729,699,600 bbl.	

*Includes 11,145,085 bbl. condensate.



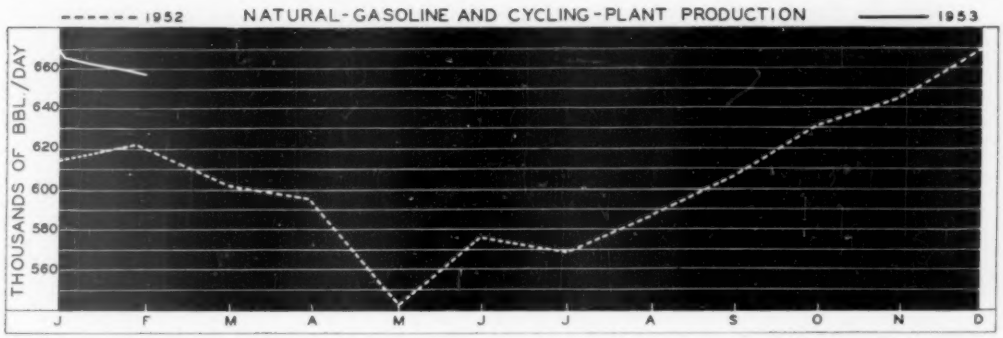


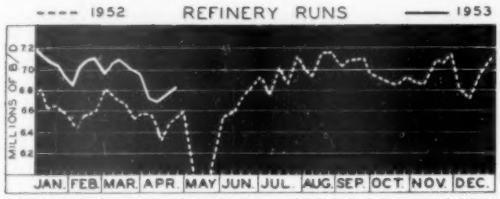
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

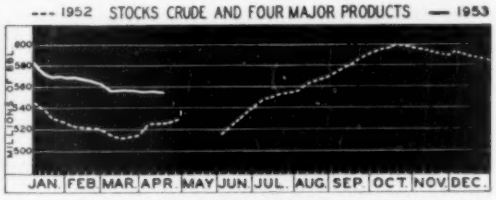
(Thousands of barrels)

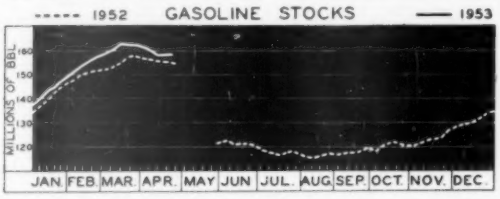
	Apr. 18, '53	Apr. 11, '53	Apr. 19, '52
Pennsylvania Grade	2,492	2,499	2,408
Other Appalachian	1,957	1,740	2,446
Illinois, Indiana, Michigan	10,908	10,632	11,208
Arkansas	3,203	3,058	3,043
Louisiana	17,141	16,658	14,002
North	2,789	2,770	2,837
Gulf	14,352	13,888	11,165
Mississippi	3,779	3,995	3,627
New Mexico	7,359	7,206	7,444
Oklahoma and Kansas	37,958	37,651	41,120
Texas	135,573	134,236	124,840
East Texas proper	11,308	11,389	11,403
West Texas	63,570	62,394	55,615
Texas Gulf	26,111	26,353	26,299
Other Texas	34,584	34,100	31,523
Rocky Mountain	16,492	16,693	14,939
California	32,558	32,610	30,445
Foreign	7,271	7,986	7,269
Total	276,691	274,964	262,791

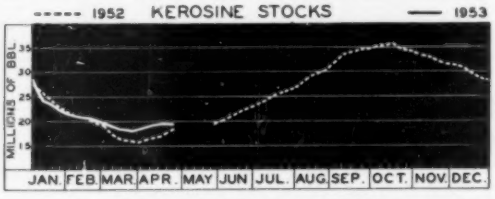
*Bureau of Mines.

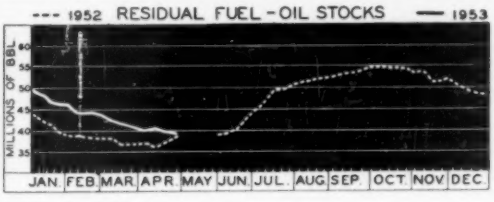










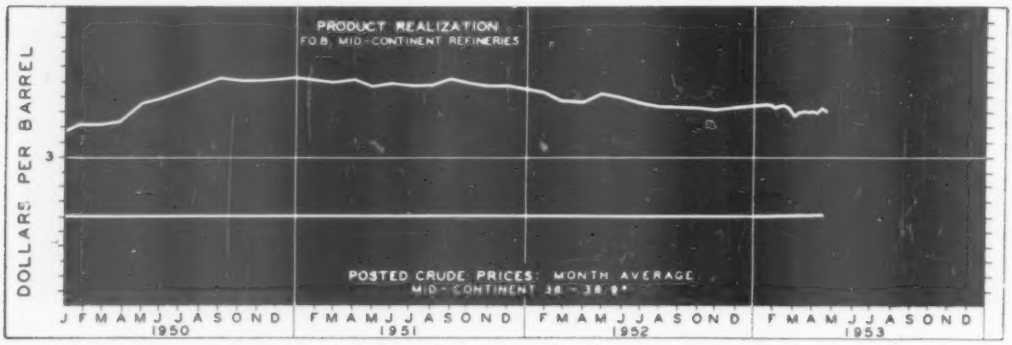


A.P.I. REFINERY REPORT, APRIL 25

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, April 1952 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,036	414.3	76.0	200.7	231.0	34,888	8,225	19,611	9,101	966	384.1	45.2	207.3	237.5
Appalachian:														
District 1	103	40.0	5.8	20.7	12.4	3,933	420	875	387	97	39.3	5.7	11.7	9.9
District 2	88	47.7	4.6	18.6	14.0	1,707	233	410	86	58	33.1	3.3	10.0	10.3
Ind., Ill., Ky.	1,140	633.0	70.6	188.9	171.4	34,805	3,475	8,424	3,281	1,201	625.8	66.8	215.6	174.3
Okla., Kans., Mo.	567	306.4	24.3	117.4	56.3	18,467	1,273	6,571	1,214	487	269.5	16.5	102.1	55.2
Inland Texas	273	176.9	10.7	45.9	34.1	6,420	280	1,109	942	251	166.6	14.1	38.5	38.5
Texas Gulf Coast	1,751	812.1	152.0	425.8	252.6	20,924	2,778	8,260	6,341	1,628	707.4	139.4	390.2	265.2
La. Gulf Coast	591	262.9	44.6	147.4	56.6	7,655	1,612	3,731	1,397	504	241.2	55.8	125.4	60.9
N. La. and Ark.	91	35.1	9.1	15.6	10.3	3,324	445	1,024	123	81	31.7	5.9	19.6	6.6
Rocky Mountain:														
New Mexico	19	11.7		2.9	3.9	146		30	29	18	10.6	0.5	2.9	4.0
Other Rocky Mtn.	196	97.4	6.4	42.3	37.7	6,812	344	1,521	822	175	83.3	5.7	36.3	35.6
California	972	470.9	6.6	154.7	385.3	18,909	348	8,936	15,311	969	402.7	7.0	152.2	355.4
Apr. 25, 1953	6,827	3,308.4	380.7	1,380.9	1,265.6	157,990	19,433	60,502	39,034	6,435	2,995.3	365.9	1,311.8	1,253.4
Apr. 18, 1953	6,686	3,248.0	379.4	1,365.9	1,243.0	157,942	19,685	61,738	39,855	.....	.....	.....	.....	.....
Apr. 26, 1952	6,600	2,986.1	359.6	1,319.4	1,290.6	155,367	18,546	51,274	38,526	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.28 for week ended April 18, $3.33 for previous week, and $3.36 for April 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of April 29, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¾-10½	12-12.75	10½-11
Premium gasoline, 86-88 octane	11¼-11½	13.125-14	11¾-12
42-44 w.w. kerosine	8⅜-8¾	10.35-10.65	9
No. 2 straw fuel oil	7⅜-7¾	9.35-9.65	8
No. 6 residual	$0.85-1.00	$2.10-2.25	$1.60-1.70

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.60	6.10	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12-13
750 vis., No. 3-4 neutral	15-16
2,000 No. 5-6 neutral	17-18

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	20.5-22
200 vis., No. 3 neutral, 0-10 pp.	12-13

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	26.5
180 vis., 10 p.t. neutral	28.5

WAX

Mid-Continent

132-134 A.M.P.	5.5

ESSO STANDARD OIL CO. announced summer-fill discounts on kerosine and heating distillates, starting with the last week of April and to continue through September 30.

With a greater shift to distillate as a home-heating fuel since the end of the war, winter demand for total petroleum products is more dependent on weather, particularly in those states in the north central and northeastern areas of the country.

Last winter was warmer than normal, and the East Coast was left with surplus distillate stocks at the end of the season. The increase in demand on the East Coast even with normal weather would have been well above the excess stocks now in primary storage in the area. Very cold weather last winter would have called for greater distillate production even with increased inventories at the beginning of winter.

The summer-fill discount is designed to move some of the excess distillate out of primary storage into secondary and consumer tanks so that additional home-heating fuel can be run to primary storage to cover the wide range of heating-oil demand, possible next winter.

The Esso discount calls for an allowance of 0.3 cent a gallon on barge and cargo sales and 0.5 cent for all other methods of delivery in the company's marketing area on the East Coast. No changes were made in the Gulf Coast prices.

There has been no official announcement of summer discounts in District 2, but distillate stocks in this district are no higher than last year.

Heavy fuel gained a little strength in the Mid-Continent over the past week. The better balance between supply and demand was not due to any increase in demand but to a reduction in refinery yield of residual, as many plants shift to asphalt production. Also, less gas at low prices this summer will increase the use of residual as refinery fuel.

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif‡	Okla. homa, Kansas	Gulf Coast Tex.*	West Tex.†
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.25		$2.12
21-21.9	2.30	2.27		2.14
22-22.9	2.37	2.29		2.16
23-23.9	2.45	2.31		2.18
24-24.9	2.53	2.33	$2.56	2.20
25-25.9	2.61	2.35	2.58	2.22
26-26.9	2.69	2.37	2.60	2.24
27-27.9	2.76	2.39	2.62	2.26
28-28.9	2.83	2.41	2.64	2.28
29-29.9	2.91	2.43	2.66	2.30
30-30.9	2.97	2.45	2.68	2.32
31-31.9	3.04	2.47	2.70	2.34
32-32.9	3.12	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Dabowal, El Campo, and Sand Point.

†Includes Lea County, New Mexico.

Last general price change represented a 50-cent increase, effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Beauregard Parish	$2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.40
Southwest Pennsylvania	3.97
West Virginia	3.91
Illinois Basin	2.77

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FOR SALE: One Barrel Type Ethyl Lead Plant, Hutex Oil & Refining Company, P. O. Box 2146, Houston, Texas.

EVERYTHING in new and used equipment for well drilling. Fishing tools rented. Save money, get quotations from Pressey & Son, Pueblo, Colorado.

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All steel roof and steel constructed tanks 4—5,000 bbl., 10—10,000 bbl., 1—25,000 bbl., 5—55,000 bbl., 2—80,000 bbl. Inspect Wichita, Kans. Will sell as is, or cut down and loaded on cars, or for steel plates.

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Good Condition for Immediate Use
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Strippers, Condensers, Pumps for Towers Available, Tube Still & Shell Stills in Operating Condition.

835 Sq. Ft. Leach Condenser (Heat Exchanger) Size 33T 214, 8 Liquid Passes.

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Complete Wax Plant
Consisting of:

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5—2000 Bbl. 5—1000 Bbl.
5— 500 Bbl. 4— 250 Bbl.
10—200 Bbl.

Write . . . Wire . . . Phone

LEFTON INDUSTRIAL CORP.
212 Victor Street, St. Louis, Missouri
Phone: LD 517

EQUIPMENT FOR SALE

N-4 BREWSTER rotary drilling rig, 12" Gardner-Denver pump w/ NKU Waukesha engine, Lee C. Moore mast, 51½' Substructure, 5800' of 3½" Ext. upset int. flush drill pipe. All purchased new. Has been in use 12 mos. A-1 condition. Write Box 4657, Oklahoma City, or Pho. ME 4-1413.

3—GENERAL MOTORS TWIN DIESELS, Model 6-71-1203. Completely overhauled; heavy duty transfer gears, starters, and skids. Replaced by gas engines on EMSCO 750. Oil States Drilling Company, Dallas, Texas. Phone PRospect 8184; or can be inspected at W. A. (Al) Hughes Yard, Abilene, Texas. Phone 2-1911.

SEPARATORS - HEATERS

3—24"x10' B S & B Separators 1000# W. P. Price $700 ea.
3—30" x 10' B S & B Separators 125# W.P. Price $200 ea.
3—B S & B Flow Line Heaters 2000# Indirect Type, Size 2' 2" x 4' 7" x 9'. Price $250 ea.

All used in First Class Condition, located near Magnolia, Arkansas.

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NICKEL-LINED PIPE

Sizes 3" to 36", 20' lengths, plain ends. Welded fittings to install above pipe.

Newman's Inc.
700 So. Maybelle, Tulsa
Phone 2-5228—LD 635

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USED ROTARY, cable tools, and production equipment. E. A. Kelly, 3131 S.E. 29th Street, P. O. Box 861, Oklahoma City. Phone Jackson 56407.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

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30,000' used seamless pipe—12¾" O.D.—⅜" wall—51 lb. per foot—in lengths from 17' to 40'—located in Indiana. Priced for immediate sale. Wire, write or phone.

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Complete National 100 Rig including 3 PTD-6 Superior Diesel Engines with dual fuel equipment, 136' Lee C. Moore Mast with 8' substructure, 2 C-350 Ideal Power Pumps, Ideal Type 548 TC Traveling Block, Type R3 Swivel, and Type MS-20½ Rotary Table. Excellent condition, priced reasonable, located in Montana. Complete inventory upon request.

Box G-341

The Oil and Gas Journal,
Tulsa, Oklahoma

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Telephone: Federal 6576

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SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

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10,000′ of New 4½" OD 11# 8RT Seamless Steel Casing @ $1.45

2,800′ of 5½" OD 17# 8RT J55 Seamless Steel Casing @ $1.50—Used 2 Weeks

3,000′ of New 4½" OD 16.60# 8RD Youngstown SMLS Drill pipe W/Hughes Tool Joints @ $4.00

1—1951 GMC 2T W/1250 Water Tank and 2" Roper Pump @ $2200.00

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Phone 57 Grinnell, Kansas

FOR SALE

1—Wilson Super Model Double Drum Low Boy Trailer Mounted 2,500′ Rotary Drilling Rig with 145-GKU Waukesha Engine, mounted with extended base for rotary table, complete with 8 x 10 x 87′ double pole telescoping mast and racking platform.

1—7¼ x 12 Gardner-Denver Model FXZ Power Driven Slush Pump unitized with skids, V-Belt Drive and NKU Waukesha Gas-Butane Engine.

All companion equipment including drill pipe, drill collars, dog house, pipe racks, etc., also available.

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or 6-9161, Box 4026, Odessa

EQUIPMENT FOR SALE

FOR SALE: Cardwell, model RL, Beam type cable tool drilling unit. At present in operation in West Central Kansas. Complete inventory and price furnished on request. K & A Drilling Co., Phone 448R or Box 497, Ellinwood, Kansas.

FOR SALE: 2—Platt Triplex 1¾" x 4" Vertical pumps. $1100.00 each F.O.B. New Harmony, Ind. Lynch Oil Company, New Harmony, Indiana.

FOR SALE: One Cardwell double drum Mobilhoist with tools. James Oil Well Service, Ph. 3-2331 or P. O. Box 2196, Hobbs, New Mexico.

FOR SALE: 80,000′ 4½ O.D. S.S. line, 60,000′ 3½ O.D. line, 60,000′ 6⅝ S.S. line. Lundquist Pipe & Supply Co., Phone 5-8850, Tulsa, P.O. Box 1215.

FOR SALE: 8—Shriver 42"x42" cast iron Filter Presses, Plate & Frame type, 18, 27, and 54 chambers, 1" cake; 15—Sperry 18"x18" cast iron Filter Presses, 11 chambers; 2—#12 Sweetland Filters for 36 leaves on 4" centers. Immediate shipment. Attractively priced. Consolidated Products Co., Inc., 17-20 Park Row, New York 38, N. Y. BArclay 7-0600.

62,000 ft.—6⅝" OD Sch. 40 seamless PE Bev. Range 2, Cleveland, Okla. 6,500 ft.—4½" OD Sch. 40 seamless PE, Bev. Range 3, Cushing, Okla. 60,000 ft.—3½" OD T&C electric weld & seamless, New, Range 1, Houston, Texas. 45,000 ft.—4½" OD T&C electric weld & seamless, New, Range 1, Houston, Texas. 13,000 ft.—2⅞" OD J-55 upset tubing 4.70, New, Houston, Texas.

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TWIN ENGINE BEECHCRAFT

EXECUTIVE TRANSPORT C-18-S . . . fitted out for executive use and in excellent condition. Always hangared. Three Pratt & Whitney R-985 engines. Time since major engine overhaul: 62 hours, right engine; 687, left engine; no hours on spare engine. Airframe time since new 1692 hours; 675 hours since major overhaul. Hamilton Standard Constant Speed Propellers. New drag link landing gear modification done by Beechcraft factory. All bulletins complied. Pilot, co-pilot oxygen system. 24-Volt electrical system. Full radio and instrument equipment. Interior luxurious and immaculate with passenger radio, razor outlet and folding desk. Two chairs, 3-place divan and private toilet in rear compartment. Exterior white top, dark blue trim, polished aluminum bottom and wings. Corporation owned and used.

Priced for immediate sale $30,000

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FOR SALE: Model R.L. 3-Drum Cardwell Spudder, Trailer Mounted, complete with all tailing-in tools. 7000 feet almost new 9/16-inch and ¾-inch lines. Will sell with or without tools. For full description and inventory, write Box G-406, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: One Sullivan 200 RTA drill mounted on tandem White Truck. Rig powered by two Buda L525 Motors. 5 x 8 Gardner Denver mud pump also mounted. Two derricks, one 45 ft. and one 68 ft. Drill has worked less than six months. 3,000 miles on truck. Priced for immediate sale. Located at 3820 North West 39th Street in Oklahoma City, Phone Windsor 2-4226. Young Exploration Company.

FOR SALE: KEYSTONE 5½ drilling machine in good operating condition with 6¼", 4¾" and other tools. P.O. Box 112, Joplin, Mo. Phone 8106.

TWO light shot hole drills. Hydraulic rigs mounted on used Ford trucks. Just came out of the field. Price $3500.000 each, with used water truck included. Located at 3820 N. W. 39th Street in Oklahoma City. Phone Windsor 2-4226. Young Exploration Company.

FOR SALE: 1—GMC Diesel Engine model #6031-C. This Unit was bought in 1947, but was never used. It also has attached a Young Unit Transmission #D-1246-S Series #456. The Transmission is used, but reconditioned, and good as new. 1—Used Waukesha 4 cylinder (old style) 125 HP. Motor, with a Boyd Transmission K-39-B double deduction 5 Speed. This Unit is in excellent condition, equipped with starter. Has been used as power plant for Cable Tool Outfit. The Oriental Refining Co., Box 118, Denver 1, Colorado.

Used Seamless STEEL TUBING

Ideal for gas, water and air lines

2¼" O.D.
3¼" O.D.
3½" O.D.
4" O.D.
5⅛" O.D.
5½" O.D.

Approximately 5 miles of each diameter available in single or double random lengths with beveled ends.

New
4" O.D. Asphalt Coated TUBING
12 gauge wall—Electric Weld
14,000 ft. available
40 ft. lengths

Write—Wire—Phone

Sonken-Galamba Corp.
2nd and Riverview (X-950)
Kansas City 18, Kansas
ATwater 9305

FOREIGN A. P. I. PIPE

Immediate Delivery from Houston Stock

POPULAR SIZES, WEIGHTS and GRADES

No P.A.D. Tickets Required

Phone, Write or Wire for Prices

LUCEY PRODUCTS CORPORATION
TULSA, OKLAHOMA
624 So. Cheyenne Phone LD - 204

FOR SALE

3—6'x10' 250# Welded Gas Scrubbers.

11—Griscom-Russell Shell and Tube Gas Coolers, Shell single pass; Tubes two-pass. 250# WP, 682 sq. ft. Admiralty Tubes.

2—Coolers same as above only for 500# WP. Heat exchangers, centrifugal pump, Clark Bros. and Cooper-Bessemer Compressor Cylinders.

C. J. Smith
Oil Capital Bldg., Tulsa
Phone 5-3416

EQUIPMENT FOR SALE

4242' NEW 17# Conversion Steel 5½" Casing 10c below list price; 6800' Good Used 3½" Drill Pipe $1.50 foot Henry E. Kriegel, 1730 Commerce Building, Houston, Texas.

10,000 NEW 1½" Standard Merchant Couplings. Special price $8.00 per hundred. Mr. Burke, P. O. Box 3235, Tulsa, Oklahoma. Telephone 6-2866.

FOR SALE: At our Lacy gasoline plant, Seminole County, Oklahoma, 1 used Braun portable distillation unit. Size G, Serial #7190 complete with or without building Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FAILING CORE drill unit mounted on 1946 Ford, light plant, dog house on trailer, pipe & tools. Good condition. Can be bought on terms. Kelly Heyen, Dorchester, Ill.

FOR SALE: Two portable engine-generator sets, Caterpillar D-13000, 75 KW, 440/880 volts, skid mounted. Suitable for full Diesel or Diesel-Gas operation. Good condition. Reda Pump Company, Bartlesville, Oklahoma.

AUCTION SALE of 3,000 foot rotary drilling rig. To be sold May 5, 1953. Crew will be on duty at 8 a.m. of sale date for demonstration, sale time 2 p.m. Description: Fred E. Cooper 563 rotary, draw works mounted on lowboy trailer, 7½ x 10 Gaso pump powered by model L Allis-Chalmers engine. Rig is complete except for drill pipe. Location: 2¼ miles east of Tyro, Kansas, south side of highway 166. Terms: cash or letter of credit. For further information contact George B. Emery, Jr., Box 498, Topeka, Kansas; or Bert Young, Box 311, Eureka, Kansas.

USED Franks Core Drill: Serial 2016 Mounted on International K-11 truck; includes: Swivel, 10 inch rotary table, 50 ft. single-piece derrick hydraulically raised, 3"x25' Kelly, butane system, less pump; reconditioned and painted. Also 1300 feet of 3½" drill pipe. Franks Mfg. Corp., Box 3218, Whittier Sta., Tulsa, Okla.

FOR SALE, F.O.B. Duncan, Okla., 2—2500 gallon practically new diesel fuel tanks complete with skids and racks (cost new $2500.00) $750.00 each. 1 used 6" kelly and bushing—$500.00. 4000 ft. used 4½" full hole A.P.I. drill pipe—$1.25 ft. J. E. Jackson, Box 61, Duncan, Okla. Phone 263.

FOR SALE: Complete Wilson single engine giant Torque-Air Rig. Excellent condition, reasonably priced, located in Michigan. Terms can be arranged to right party or would consider selling working interest. Box G-456, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT WANTED

WANTED TO BUY: Good used 80 or 100 horse steamer for mounting on float or truck. Box G-466, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WANTED TO BUY: Marginal or abandoned oil properties in Eastern United States. Give complete details first letter. Box G-432, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: One good used Bucyrus-Erie 28 L or 36 L with or without tools. Suburban Well Drilling Company, Lake Street and Church Road, Elmhurst, Illinois.

WANTED: 1500 Foot Rotary with 2⅞ or 3½ Drill Pipe complete. Send price and inventory to Box 378, Cherryvale, Kansas.

NOTICE: We buy. We sell equipment everywhere. If you want to sell or buy, contact Pressey & Son, Pueblo, Colorado.

WANTED
GAS COMPRESSORS

Gas engine driven, two or three compressor throws. Total approximately 900 hp. in two or three machines. Give full particulars in first letter. Address replies to:

P. O. Box 13022, Houston 19, Texas

HELP WANTED

GEOPHYSICIST for Caracas, Venezuela, to assist Chief Geophysicist. Must be fully qualified in interpretive work, field supervision, and correlating geophysical information from various sources. Will assist in planning and directing geophysical field program. Should have college degree in geology or geophysics and a number of years geophysical experience in a supervisory capacity. Liberal salary and living allowance. Give full details in reply to P. O. Box 2819, Dallas, Texas.

GRADUATE Chemical Engineers and chemists with or without experience for positions in research and development department, located in Tulsa. State qualifications and salary expected. Write Personnel Department, P. O. Box 381, Tulsa 2, Oklahoma.

PETROLEUM ENGRS., GEOLOGISTS, REFINERY MEN; Rocky Mtn. positions with Majors and Independents. Specialists in drilling, production, reservoir, refinery operation. Professional Placement Service, 516 University Bldg., Denver, Colorado.

PETROLEUM ENGINEER

Required by independent company for foreign assignment. Responsibilities initially involve personally conducting comprehensive reservoir tests on new field and thereafter preparing and directing complete field development program. Minimum five years field experience. Liberal salary and allowances. Single quarters furnished. Please reply to Box G-434, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC PERSONNEL needed for United States and Canada by well known and expanding contract geophysical company. Address Box E-863, The Oil and Gas Journal, Tulsa, Oklahoma

ELECTRICAL AND INSTRUMENT ENGINEER

Responsible for the maintenance and installation of electrical equipment and instruments in a complete refinery of an independent oil company located in the southwest. Must have a degree in electrical engineering and at least 5 years experience in a refinery. Will assist Chief Engineer in developing specifications for electrical equipment and instruments. Will supervise the installation and maintenance of same. Salary open subject to experience and qualifications.

Box G-462, The Oil and Gas Journal, Tulsa, Oklahoma

PETROLEUM ENGINEERS

FOREIGN SERVICE

Graduate engineers with good background in general physics, mathematics, mechanics and with some laboratory experience in equipment and techniques. For laboratory position responsible for theoretical experimental studies on reservoir fluid and rocks. Duties will consist of designing equipment, performing or supervising testing and analyzing and reporting results. Studies pertinent to evaluation of primary depletion practices and applicability of secondary recovery for pressure maintenance operation will be required.

Please write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
BOX OG-5
Arabian-American Oil Company
505 Park Avenue
New York 22, N. Y.

HELP WANTED

LAND MAN

Large company which is well known in Southern states has recently opened a district Geological, Exploration and Production office in New Orleans and needs for that office a land man familiar with South Louisiana. Such man should also have familiarity with Southern Mississippi. Prefer a man under 42 years of age and one familiar with farm-out negotiations, operating contracts, lease acquisitions and lease record procedure and titles. Company is entering South Louisiana on a conservative basis. In replying state age, experience in detail, education, and references, enclosing recent photograph. So as not to jeopardize your present position your application will be held in confidence. Box G-453, The Oil and Gas Journal, Tulsa, Oklahoma.

GAS ENGINEER

Independent producer of oil and gas needs experienced gas engineer to take charge of operation of gas properties and to assist with all production problems involving gas. Man filling this job needs experience in field operation of gas distillate wells, small field compressor installations, and gas-lift installations. Give resume of experience, enclosing small photograph if possible. Box G-436, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Energetic, conscientious and capable petroleum engineer as production superintendent for well-established independent company. Experienced in completing, equipping, drilling practices; taking of BHP and OGR tests. Excellent opportunity for one with real ambition. Replies strictly confidential. Write complete data and salary expected. Box G-464, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES MANAGER

Men between ages 27 and 42 to handle sales of oil field drilling and production equipment. Manufacturer is represented in all major oil fields in United States. Applicants must have previous experience in handling men and selling to oil field drilling trade. Man can make good salary at present volume with excellent opportunity to increase sales. Write **Box G-459, The Oil and Gas Journal, Tulsa, Oklahoma.**

MAINTENANCE SUPERINTENDENT

Wanted by smaller Kansas refinery with ambitious plans. Excellent opportunity for man who can handle men, read blue prints and carry out miscellaneous construction and maintenance **AND** who wants to grow and advance with the organization. Give details of experience, references and salary desired. Our own people know of this ad. Reply to

Box G-458
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

PROCESS DESIGN ENGINEERS

•

A major engineering and contracting company requires Process Design Engineers with M.S. degrees in Chemical Engineering with 1 to 3 years of experience in process design of oil refinery and petrochemical plants.

Excellent opportunities for advancement and professional growth.

Reply giving details of education, experience and salary requirements. Replies will be held in strict confidence.

•

ARTHUR G. McKEE & CO.
2300 Chester Ave.
CLEVELAND 1, OHIO

HELP WANTED

PETROLEUM GEOLOGIST: About 35 years of age who has had experience in Permian and Pennsylvanian areas, as in West Central and North Texas, Oklahoma and Kansas, both subsurface and surface. Will headquarter in Fort Worth but must be willing to be away from home a reasonable amount of time. Give details of education, experience and salary expected. HILL & HILL, Attention: R. R. Thompson, Geologist, 1325 Forth Worth National Bank Building, Fort Worth 2, Texas.

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

WANTED experienced core drillers for work in Kentucky and Indiana. Lewis and Clemens Drilling Company, Box 101, Princeton, Indiana.

LUBE OIL BLENDING AND PACKAGING SUPERVISOR

Responsible for the operations of a modern blending and packaging plant which is a part of a complete refinery of an independent oil company in the southwest. Must have thorough knowledge of drum reconditioning, drum and can filling, box car shipping, and lube oil blending operations. College degree preferred. Salary open subject to experience and qualifications.

Box G-461, The Oil and Gas Journal, Tulsa, Oklahoma

PETROLEUM ENGINEER

FOR OVERSEAS POSITION

WITH MAJOR OIL COMPANY

Must be 22 to 35 years of age, graduate of recognized engineering college, with 3 years minimum intensive experience in all phases of oil field drilling, development, and production.

Exceptional opportunity for single man or married man agreeable to 12 months separation period. Salary commensurate with ability and experience, plus living and separation allowances and complete employee benefits. Send complete resume to:

BOX G-465

The Oil and Gas Journal,

Tulsa, Oklahoma

WANTED

CHIEF GEOLOGIST

for

Aggressive Independent Oil Company

Operating in Rocky Mountain Area, Mid-Continent, North and West Texas.

Experience in these areas desirable. Give complete details of education and experience by letter in duplicate. All replies held confidential.

Box G-460

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

SITUATIONS WANTED

LANDMAN: Experienced in major company administrative and field land operations. College and legal education and licensed attorney. Desires change to expanding independent organization for responsible assignment. Box G-437, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, 32, five years Rocky Mountain and two years Mid-Continent—Gulf Coast major company experience wants job with independent company Rocky Mountain Area. Box G-440, The Oil and Gas Journal, Tulsa, Oklahoma.

ELECTRICIAN—8 years experience major chemical company—2 years utility company. Married—age 27—desires maintenance major oil company—South America. Box G-447, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED ENGINEER: Experienced in design, construction, maintenance, and relief supervision on gasoline plant and refinery units — crude, asphalt, catalytic cracking and product treating units. Twenty years diversified experience. Age 42. Desires relocation. Box G-443, The Oil and Gas Journal, Tulsa, Oklahoma.

DISTRICT Landman, 37, married, seven years Texas experience, location open, excellent references. Box G-446, The Oil and Gas Journal, Tulsa, Oklahoma.

SECRETARIAL and Office Management Business woman with extensive experience prefers small office Mid-Continent or Rocky Mountain area. Box 155, Tulsa.

GRADUATE PETROLEUM ENGINEER. Master's Degree in Business Administration. Married; age 35. Seven years experience in production, reservoir and evaluation engineering. Registered Engineer, Texas. Looking for opportunity with independent or individual. Box G-455, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico Personal interview by appointment is desired. Makin Drilling Company, Box No 1628. Ph. No. 3-3141, Hobbs, New Mexico

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column? Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal

GEOLOGISTS

NO OIL NO PAY—Geochemical exploration—Iroco Laboratory—P. O. Box 630, Stillwater, Okla.

LEASE AND DRILLING BLOCKS

"SHALLOW PRODUCTION is scarce. You'll get it on my Tennessee structures." N. M. Sauls, Geologist, Cookeville, Tenn.

FOR Central Kansas drilling deals see Lewis Short, Burrton, Kansas

Canadian Oil Royalties, Leases and Production

AS SPECIALISTS TRADING IN OIL PROPERTIES, WE INVITE YOUR ENQUIRIES.

WRITE:
810a FIRST ST. WEST,
CALGARY - ALBERTA
TELEPHONE: 65711

Simsbury OIL CORPORATION LTD.

LEASE AND DRILLING BLOCKS

HAVE six sections Federal lease, rent paid three years, North, East and South of deep test now drilling near Florence, Pinal County, Arizona. Close enough for excellent speculative opportunity. Box 842, Scottsdale, Arizona.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

WILL SELL nine producing wells on 400 acres with proven locations yet to be drilled. Situated in Western Kansas. Address C. M. Powell, 909 Central Bldg., Wichita, Kans.

HAVE MADE Gravity Meter and Magnetometer surveys and worked up subsurface control over approximately 150,000 acres in East Central Oklahoma. Several good looking drilling locations ranging from 2200 to 2700' depths to test silicious. Need a partner to carry half or three-fourths interest. You can operate or I will operate. Box G-449, The Oil and Gas Journal, Tulsa, Oklahoma.

SEE A. L. Bowles, Rollow Building, Ada, Oklahoma, for drilling deals.

320 OIL LEASE on Seismic High. Requires 4500 foot Strawn test, 90 days. 7 locations. Box G-448, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 26 producing wells located in Salt Flats Field, Luling, Texas. Total production approximately 3500 barrels per month can be increased by close supervision. 5 houses, supplies, and equipment. Plenty of acreage to drill additional wells. A real bargain and a good opportunity to get into the oil business. Priced to sell at $175,000.00. Contact Kenneth Blackmar, Luling, Texas, or Riddle Oil Co., 59 East Van Buren, Chicago 5, Illinois.

I CAN SECURE 640 acres lease 1320 feet of one of the best wells in the Elk City, Oklahoma, field. Can get this for no bonus, just a well and override to me. Wonderful opportunity to make a lot of money. Box G-454, The Oil and Gas Journal, Tulsa, Oklahoma.

S. E. NEW MEXICO OIL AREAS

INVESTORS who wish unbiased engineering reports & not promotion matter. Furnished data re-important indicated fields Permian & deep zones. Royalty & leases close to proposed wells.

W. J. PETERMAN, Geologist
Portales **New Mexico**

LEASES ROYALTIES

Producing and Nonproducing

Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis 5, Mo.

Producing Property Wanted

Interested in acquiring oil or gas producing property with substantial reserves. Large deal preferred. Also interested in drilling deals. Contact

Box G-463, The Oil and Gas Journal, Tulsa, Oklahoma

BIG FRESH OIL BOOM IN LEASES

in Eastern North Dakota — Walsh and Nelson Counties. Wire or write for locations and prices.

F. W. Dyer

1835 Champa, Denver, Colorado

ROYALTIES

QUICK CASH: Producing royalties, Overrides or Production . . . no delay. Phone 72-4533, Robert L. Kinkaid . . . P.O. Box 26, Tulsa, Oklahoma.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

ROYALTIES WANTED

Producing Royalties
High Grade Only
Send Full Particulars
Address

C. C. HARMON

718 World Bldg., Tulsa, Okla.
P.O. Box 2151

REAL ESTATE

HOUSTON, TEXAS, $50,000 Air Conditioned Home, will trade for producing royalty or farm close to Houston. Box G-452, The Oil and Gas Journal, Tulsa, Oklahoma.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

FOR RENT OFFICE SPACE

AIR CONDITION OFFICE SPACE. 8,000 Sq. Ft. Two blocks from Post Office. Also Warehouse Space. Hall Investment Company, 224 East 4th Street, Tulsa, Oklahoma. Phone 2-6167.

BUSINESS OPPORTUNITIES

INDEPENDENT AGENCY, working with Oil Industry in Midwest. Extensive background in all phases of the business, including Refining, Marketing and Production. Facilities available to handle desirable distributorship of products or equipment Box G-457, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer wants man experienced drilling production with $10,000 or equivalent equipment to form drilling partnership. I have $10,000. Dallas office, yard space and shop equipment with working access to associates steel supplies. Reply to Arnold Evans, AAA Drilling Company, P.O. Box 6246, Dallas.

DO YOU Want Capital? Then for a substantial interest in your producing oil and/or gas properties without your risking a loan-squeeze or sacrifice-sale will you accept adequate working capital to meet obligations, drill more wells, or acquire more producing leases? Box G-429, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE BY ALASKANS

Stock in an Alaskan corporation with leases on 66,560 acres of government leased ground unitized in one block 90 air miles from Phillips Petroleums recent acquired property in Alaska $1.00 per share non assessable write for prospectus or contact your broker each certificate shall be for 100 shares or more.

ALASKA OIL AND GAS DEVELOPMENT CO.
(Please use air mail)
Anchorage, Alaska

PRODUCTION WANTED

INDEPENDENT Oil Company desires to purchase production amounting to at least 1,000 barrels per day. Submit full details together with competent engineering report. Confidential. Box G-404, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION FOR SALE

18 BARRELS daily production — shallow field Eastern Kansas. Phone 4-1213 or write V. E. Sheffer, 500 Petroleum Bldg., Wichita, Kansas.

DRILLING DEALS WANTED

RELIABLE well drilling contractor with good equipment desires connection with individuals or small groups wanting wells drilled, or a development program in Oklahoma. Will drill your lease or help you secure good leases and drill for you. Sellers and Sellers, Box 606, Holdenville, Oklahoma, Phone 1098.

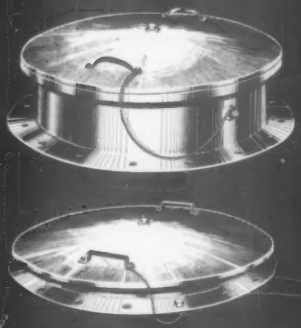
ADVERTISERS

Aerofin Corporation 24
Allis-Chalmers Mfg. Co. 25
Alten Foundry & Machine Works 183
American Iron & Machine Works Co. 9
American Locomotive Company 130, 131
American Optical Company 15
Anderson Brothers 158
Armstrong Machine Works 119
Avondale Marine Ways, Inc. 142
Baird Mfg. Co. 189
Baker Oil Tools, Inc. 62
Bauer & Black Division of The Kendall Company 27
Beaumont Iron Works, A Subsidiary of American Locomotive Co. 59
Beech Aircraft Corp. 14
Beryllium Corporation, The 58
Bethlehem Supply Co. 140
Black, Sivalls & Bryson, Inc. 13
Bowen Co., S. R. 192
Brodie Co., Inc., Ralph N. 154, 155
Brooks Paper Co. 126
Cable Engineering 189
Carboloy Department of General Electric Company 29
Charles Machine Works, The 197
Chase Brass & Copper Co. 16
Chicago Bridge & Iron Company 81
Chicago-Wilcox Mfg. Co. 176
Chrysler Corporation, Industrial Engine Division 19, 20, 21, 22
Cities Service Oil Co. 123
Clark Equipment Company 193
Classified Advertising 203, 204, 205, 206
Cooper, Inc., Fred E. 38, 39
Copies, Inc. 133
Darling Valve and Mfg. Co. 48
Dean Brothers Pumps, Inc. 129
Degen Pipe & Supply Company 187
Delta Engineering Sales Co. 177
De Zurik Shower Co. 124
Dowell Incorporated 94
Dresser Manufacturing Division 127
Drilling & Service, Inc. 194
du Pont 17
Edward Valves, Inc. 32
Empire Trust Company 190
Emsco Manufacturing Company 7
Enardo Manufacturing Co. 122
Equivalent Valves Company 176
Fairbanks, Morse & Co. 2
Filtrol Corporation 64
Fluid Packed Pump Company 111, 112
Fluor Corporation, Ltd., The 174
Four Wheel Drive Auto Co., The 28
France Packing Company 177
Fulton & Company, R. H. 152
Gaso Pump & Burner Mfg. Co. 43
General American Transportation Corporation 60
General Electric Company 23
General Electric Co., Electronic Dept. 26
Geolograph Company, Inc., The 129
Globe Oil Tools Company 170
Goodall Rubber Company 160
Grancell, I. H. 171
Grove Regulator Co. 10, 11
Guiberson Corporation 162
Gustin-Bacon Manufacturing Co. 108
Halliburton Oil Well Cementing Co. 12, 52
Harbison-Fischer Mfg. Co. 196
Haynes Stellite Company, Division of Union Carbide and Carbon Corporation 185
Houston Contracting Company 156
Huey & Co., S. E. 167
Hughes Tool Co. Back Cover
Hyster Company 37
Inferno Co., The 173, 184
International Harvester Co. 115
Jacobson, E. C. 188
Johnson Motors 134
Jones & Laughlin Steel Corporation Supply Division 23
Kemp Mfg. Co., C. M. 40
Kennametal, Inc. 144
Kohler Co. 188
Koppers Company, Inc. 33
Lane Plating Works 198
Lane-Wells Company 41
Larkin Packer Company, Inc. 150
Link-Belt Company 3
Lonergan Co., J. E. 166
Macwhyte Co. 3
Manning, Maxwell & Moore, Inc. 34
Marsh Instrument Co. 42
Martin, Manufacturer, John N. 125
Mayhew Supply Co., Inc. 146
Mayo Hotel, The 158
McCord Corporation 164
Mercoid Corp., The 105
Metal Goods Corporation 44
Mission Mfg. Company 98, 99
Murphy, Frank W. 123
National Airoil Burner Co., The 177
National Geophysical Company, Inc. 178
National Supply Co., The 102
Nelson Electric Supply Co. 157
Nicholson & Co., W. H. 55
Nordstrom Valve Division, Rockwell Manufacturing Company Inside Front Cover
Oil and Gas Journal, The 124
Oil Center Tool Co. 123, 190
Onan & Sons, Inc., D. W. 195
Otis Pressure Control, Inc. 57
Pacific Pumps, Inc. 36
Page Fence Association 55
Paris Distributor, Inc., Henry H. 106
Peerless Supply Co., Inc. 167
Petroleum Distributing Co. 194
Petroleum Equipment Suppliers Assn. 96, 97
Philadelphia Gear Works, Inc. 8
Powers Regulator Company, The 45
Pure Oil Company, The 136
Radio Corporation of America 53
Reliance Electric and Engineering Co. 49
Republic Rubber Division of Lee Rubber & Tire Corp. 56
Roebling's Sons Company, John A. 6
Ryerson & Son, Inc., Joseph T. 114
Sawyer & Son Co., The H. M. 153
Schutte and Koerting Company 18
Scott-Rice Company 172
Seismograph Service Corp. 180, 181
Shand & Jurs Co. 208
Sherman Products, Inc. 128
Southern Mill & Mfg. Co. 173
Spang-Chalfant Division of The National Supply Co. 103
Standco Brake Lining Co. 172
Steel Forgings, Inc. 187
Stewart & Stevenson Services, Inc. 30, 31
Struthers Wells Corporation 196
Templeton, Kenly & Co. 172
Thomas Flexible Coupling Co. 104
Thompson Pump Company 119
Timken Roller Bearing Company Front Cover
Toledo Pipe Threading Machine Co. 187
Trostel Packings, Ltd., Albert 110
Tuboscope Company 35
Union Asbestos & Rubber Co. 50
Union Carbide and Carbon Corporation, Haynes Stellite Company 185
U. S. Steel Corp. Subsidiaries 4
Unit Rig & Equipment Co. 156, 171, 172, 184, 189, 197
United Supply & Manufacturing Co. 54
Visco Products Co., Inc. 93
Warner Electric Brake & Clutch Company 124
Well Equipment Mfg. Corp. 191
Western Company 168, 169
Wheatland Tube Company 51
Williamson, Inc., T. D. 159
White Eagle Oil Co. Inside Back Cover
Witte Engine Works Oil Well Supply Division, United States Steel Corporation 4
Wolverine Tube Division of Calumet & Hecla, Inc. 46, 47
Zink Company, John 197

"BLUE CHIP" *Investments*

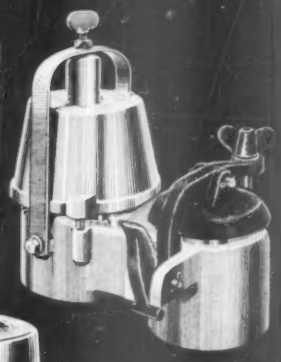
S&J Pilot Operated Safety Relief Valve, Fig. ST-5000, provides positive protection to tanks from overpressure within range from 1 to 10 pounds.

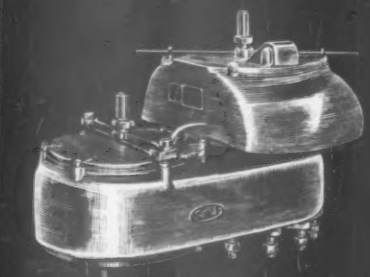
The Shand & Jurs line of Pressure and Relief Valves and equipment for petroleum tanks truly provide extra "dividends" from the air. These conservation fittings deliver substantial savings by reducing evaporation losses, consequent reduction in volume of liquid as well as loss of gravity. There is an S&J Breather Valve or Vent available for almost every tank requirement.

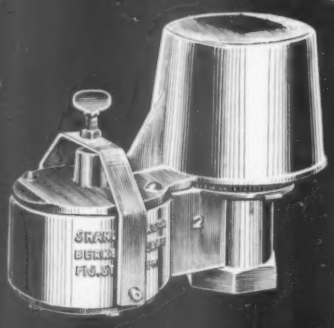


S&J Emergency Vent, Figs. ST-5455 and ST-5455A, provide emergency venting for surges, unusual thermal conditions or over-filling. Fits Standard 20" A.P.I. manholes.

S&J Combination Breather Valve and Gage Hatch, Fig. ST-1615. Economical venting for small marketing and bulk plant tanks.







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S&J Breather Valve, Fig. ST-3695R features a one piece vacuum-pressure valve cover for quick accessibility. Available in 2, 3 and 4 inch sizes.

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342 Madison Ave.

CHICAGO
10409 S. Western Ave.

HOUSTON
M & M Bldg.

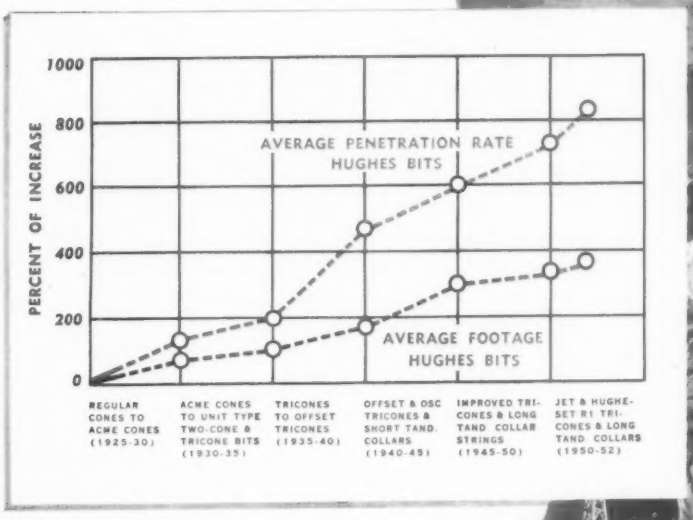
TULSA
Thompson Bldg.

LOS ANGELES
714 W. Olympic Blvd.

REPRESENTATIVES:
SEATTLE: Nebar Supply Company, 3000 Western Avenue
MONTREAL: Lytle Engineering Specialists, 360 Notre Dame St., W.
TORONTO: Lytle Engineering Specialists, 85 Richmond St., W.
VANCOUVER: P. D. McLaren & Son Ltd., 3277 Main Street
CARACAS: Sinclair Spence, C.A., Edificio Galipan
ENGLAND: Whessoe, Ltd., Sales: 25 Victoria St., London, S.W. 1
Whessoe, Ltd., Mfrs: Darlington, Durham County

Moving Ahead
H&P Inc.
HELMERICH & PAYNE Inc. · TULSA OKLA.
White Eagle Oil Company
and its wholly owned subsidiary
Helmerich & Payne, Inc. has
established a reputation for depend-
ability in its 34 years as a drilling
and producing company . . .
The finest in personnel plus the
best equipment in the field
all add up to
an outstanding job.
WHITE EAGLE OIL CO.
Helmerich & Payne, Inc.
• Wholly Owned Subsidiary
TULSA, OKLAHOMA

DRILLING INDUSTRY TEAMWORK PRODUCED THIS ACHIEVEMENT


PERCENT OF INCREASE
1000
800
600
400
200
0
AVERAGE PENETRATION RATE HUGHES BITS
AVERAGE FOOTAGE HUGHES BITS
REGULAR CONES TO ACME CONES (1925-30)
ACME CONES TO UNIT TYPE TWO-CONE & TRICONE BITS (1930-35)
TRICONES TO OFFSET TRICONES (1935-40)
OFFSET & OSC TRICONES & SHORT TAND. COLLARS (1940-45)
IMPROVED TRI-CONES & LONG TAND. COLLAR STRINGS (1945-50)
JET & HUGHE-SET R1 TRI-CONES & LONG TAND. COLLARS (1950-52)

The above chart is more than a record of the performance of Hughes rock bits. The increase in penetration rate of approximately 800% and almost 400% increase in footage drilled per bit, during the past 27 years, reflect the achievement of the industry.

Better bit designs alone could not have accomplished this. It took the know-how and experience of the *drilling contractors* and *drilling departments of the oil companies*, and the cooperation of the entire drilling industry to develop the techniques and equipment that have helped produce this outstanding performance record.

As a result of this combined industry effort, improved bit penetration and footage drilled per bit have partially off-set rising drilling costs. We are proud of the important part that HUGHES has played in this achievement.